An Evaluation of Web-Based Preference Assessment Methods Using the Assessment of Preferred Leisure Alternatives for Youth (A-PLAY): Identifying Physical Activity Preferences of Youth

By

Erica L. Taylor

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Chairperson Jomella Watson-Thompson, Ph.D.

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Vicki Collie-Akers, Ph.D., MPH, Committee Member

_____

Pamela L. Neidert, Ph.D., Committee Member

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The Thesis Committee for Erica L. Taylor certifies
that this is the approved version of the following thesis:

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Chairperson Jomella Watson-Thompson, Ph.D.

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Abstract

The present study examined the Assessment of Preferred Leisure Alternatives for Youth (A-PLAY), a web-based preference assessment application that is designed to efficiently identify preferred types of physical activities for youth. The study evaluated the reliability of the A-PLAY across several preference assessment methodologies including paired stimulus, multiple stimulus without replacement, and rank order assessments. The test-retest reliability of the assessment methods completed by individual participants was also evaluated across multiple sessions. The study participants (N = 14) consisted of typically developing males and females, ranging from seven to fourteen years of age. Results of the assessments show that youth reliably selected preferred activities across sessions ($M\ r_\tau$ = .611 [$p \leq$.001]), across time ($M\ r_\tau$ = .580 [p <.01]), and across assessment methodologies ($M\ r_\tau$ = .632 [$p \leq$.001]). The results suggest that the A-PLAY provides a reliable approach for conducting preference assessments with typically developing youth in community–based settings using computerized technology. The use of a web-based preference assessment instrument contributes to current research in Applied Behavior Analysis by examining the use of preference assessment methodologies with typically developing youth and in community-based settings.

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My highest thanks to God, for reasons that He already knows.

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An Evaluation of Web-Based Preference Assessment Methods Using the Assessment of Preferred Leisure Alternatives for Youth (A-PLAY): Identifying Physical Activity Preferences of Youth

Physical activity is a critical component of child and adolescent health and development. According to the Centers for Disease Control and Prevention (CDC) (2014), youth from the ages of 6 to 17 years should engage in at least 60 minutes of physical activity every day. According to the U.S. Department of Health and Human Services (2012), youth engaged in regular bouts of physical activity are more likely to have fewer incidences of chronic diseases, such as hypertension and type 2 diabetes. Further, youth engaged in physical activity will have improved cardiorespiratory fitness, stronger bones and muscles, maintained (or improved) healthy body weight, and potentially reduced symptoms of anxiety and depression (U.S. Department of Health and Human Services, 2012). There are also positive associations between youth engagement in physical activity and higher levels of academic performance and increased social connectedness (Rasberry, et al., 2011).

Despite the benefits of youth engaging in physical activity, only 33.3% of youth in the United States participate in daily physical activity (Healthy People, 2020). Furthermore, only 18.4% of youth in grades 9 through 12 met the aerobic physical activity guidelines of 60 minutes of daily physical activity (Healthy People, 2020). Although regular participation in physical activity is low for all youth (approximately 67%), it is disproportionately lower for minority youth, particularly African-American (21%) and Hispanic females (21.9%), as well as low-income youth, who are 42% more likely to not reach physical activity recommendations (Basch, 2011; Lampard, Jurkowski, Lawson, & Davison, 2013).

Research suggests that youths' selection of physical activity preferences should be a part of an intervention program (e.g., Wilson et al. 2005). The Task Force on Community Preventive Services (2002) recommended offering individually-adapted health behavior change programs as an approach to increase physical activity. These programs are structured around "the individual's specific interests [and] preferences" (The Task Force on Community Preventive Services, 2002; p. 70). Ying-Ying et al. (2009) also noted the importance of individualized interventions that should include physical activities for youth that omit "boring activities" (p. 498). One approach to ensure that preferred activities are included in physical activity interventions is to implement preference assessments. Preference assessments may allow implementers to identify youths' preferred activities while also identifying less preferred (or boring) activities, which may better inform youth programming (Ying-Ying et al., 2009).

School-Based Youth Physical Activity Opportunities

School has been identified as a critical sector in which to promote physical activity opportunities for youth, as evidenced by the Healthy People 2020 physical activity objectives and guidelines. However, daily physical education is provided in only four percent of elementary schools and ten percent of middle and high schools combined (US Department of Health and Human Services, 2012). Additionally, opportunities to engage in physical activities are limited during school hours, as only 13.7 % of elementary, middle, and high schools required daily physical education classes for all students as of 2006 (Healthy People, 2020). Further, physical activity programs that were implemented in schools were found to result in modest changes in physical activity levels (Wilson et al., 2005). In the United States overall, regularly scheduled recess in elementary schools is required in only seven states as of 2006 (Healthy People, 2020). Therefore, opportunities for youth to engage in physical activity are limited during school hours,

which suggests the need to further explore how to engage youth in physical activities during non-school hours.

Engaging Youth in Physical Activities during Out-of-School Time

Forty-six percent of youth in the United States do not participate in community-based physical activity programs (CDC, 2014) during out-of-school time. Therefore, it is important to determine how to engage youth in physical activity also during out-of-school time. One form is through after-school organized sports programs, such as school sports teams and community-based sports programs, which promote physical activity (e.g., Amateur Athletic Union [AAU] teams) opportunities for youth during non-school hours. Furthermore, structured leisure-time after-school programs (e.g., Boys and Girls Club), are another mode for promoting engagement in physical activity opportunities, as these programs are attended by 25% of low to moderate income youth (Lee, Srikantharajah, & Millelsen, 2010). Although these types of programs are typically well-received by youth participants and parents, effectiveness in improving physical activity outcomes has not been shown (US Department of Health and Human Services, 2012), or commonly sustained (Atkin, Gorley, Biddle, Vavill, & Foster, 2010). However, Atkin et al. (2011) suggested that interventions that focused on physical activity alone may be an effective strategy to engage youth

Youth physical activity programs that have been implemented during leisure time have found mixed results. Wilson et al. (2005) attempted to increase youth participation in physical activity during leisure time for youth enrolled in intramural sports programs, with regular access to the facility. Wilson incorporated motivational tactics through the implementation of goal setting and self-monitoring. Physical activity measures (via accelerometer recordings) were

taken at baseline and post-treatment. However, researchers did not observe increases in youths' physical activity following the intervention.

Programs that include specific physical activity programming, such as soccer (e.g., Weintraub et al., 2008), dance (e.g., Robinson et al., 2003), and general aerobics classes (e.g., Barbeau et al., 2007) led to an increase in physical activity levels in youth during implementation. However, these interventions were relatively short in duration lasting six weeks to one year, and not long-term. Therefore, the increased levels of physical activity obtained by the youth participants may not have been maintained. Newton, Wiltshire, & Elley (2009) included the use of pedometers and text messaging prompts to increase the physical activity of 38 youth aged 11 to 18 years. Text messages were sent to participants weekly during the 12-week intervention. Although "gadget appeal" (p. 814) was thought to be a motivating factor to increase physical activity, levels of physical activity did not increase.

Maintaining or achieving higher levels of physical activity with low-income and urban minority youth may be even more challenging (Basch, 2011). Wilson et al. (2005) posited that "underserved adolescents including…those of low socioeconomic status are less physically active than adolescents who are…of [higher socioeconomic status]" (p. 2). The communities in which low-income youth reside and go to school often have reduced access to programs that promote health, such as physical activity programs (Ullrich-French & McDonough, 2013), and more limited facilities with adequate resources (Romero, 2005). Additionally, youth in underprivileged communities lack the monetary resources to participate in fee-based extra-curricular programs that promote physical activity due to cost constraints. A lack of enjoyment in provided activities within programming has been noted to be an additional barrier to youth engagement, as evidenced by youths' lack of interest in provided activities (Sanderson &

Richards, 2010), and preference to decide what is included in programming (Hohepa, Schofield, & Kolt, 2006; Mitra & Serriere, 2012) . Wilson et al. (2005) increased physical activity with low-income youth by allowing the youth involved in the program to select from a variety of physical activity options in which they could participate.

Participant Choice and Preference Selection of Leisure Activities.

It is important to provide choice opportunities for people who often may not have the right or occasion to choose, particularly those from vulnerable populations (Bannerman, Sheldon, & Sherman, 1990). Vulnerable populations are defined as "those at greater risk for poor health status" (The American Journal of Managed Care, 2006), which includes both low-income and minority youth. Inesi et al. (2011) described choice as one's ability to select options, which allows for a sense of personal control. When choice is constrained, individuals may engage in negative behaviors, such as disengagement and disruptive actions during class (Dunlap et al., 1994). Further, researchers noted that there are "deleterious consequences when choice-making opportunities are absent from one's life, [for example], learned helplessness" (Inesi et al., 2011; p. 152). Therefore, restricting opportunities to identify preferences to appropriately identify and offer activities that serve as potential reinforcers may result unsuccessful program outcomes, or the individual withdrawing from the behavior change program (Bessell, 2011). As described by Hanley, Iwata, & Lindberg (1999), a distinguishing feature of client-centered programming for vulnerable populations (e.g., low-income youth, individuals with developmental disabilities) is to assure client preferences in recreational options.

When youth are not given the opportunity to choose or provide input regarding the structure of programs, the result may lead to disengagement in the program, particularly for activities that are voluntary Excessive disengagement or idleness (Woo & Sakamoto, 2010) is

associated with increased engagement in anti-social or self-destructive behaviors (i.e. drug use and violence), particularly when youth are not afforded opportunities that support pro-social behaviors (Day et al., 2012; Ramey et al., 2010). In both urban and low-income communities, engagement in anti-social behaviors may be even more prominent since youth may be more likely to be presented with opportunities (e.g., accessibility to gangs, drug trafficking, firearm possession) that support self-destructive behavior (Sanderson & Richards, 2010) due to the lack of positive alternative activities within the immediate environment. Youth residing in an urban community stated, "With more youth based activities, there would be less crime in [the] city and fewer youth looking for 'bad things to do'" (Foster-Fishman et al., 2010, p. 74). Research has shown that when youth are given the opportunities to make choices regarding preferred activities, negative behaviors tend to decrease (Romaniuk, Miltenberger, Conyers, Jenner, Jurgens, & Ringenberg, 2002), and engagement in preferred positive behaviors increases (Cole & Levinson, 2002; Dunlap et al. 1994).

It is critical that participants are empowered to have input and a choice in identifying the types of activities they engage in during their leisure time. Hanley et al. (1999) stated that an emphasis on client preference is "a prominent feature of person-centered planning" (p. 419), and should be used as the foundation for service delivery. It is the utilization of identified preferences that aid in the effectiveness of program activities (Green, Reid, Canipe, & Gardner, 1991). Similar findings emerged in later research in which clients identified their own preferred leisure alternatives (e.g., physical activities) to increase participation in client-centered programming (Wilson et al., 2005; Chang, 2011).

Purpose and Types of Preference Assessment Methods

In the field of Applied Behavior Analysis, preference assessments are commonly used to identify clients' preferred items or activities that may serve as reinforcers; items identified as high preference and are then included in reinforcement-based strategies to increase a target behavior (e.g., Fischer et al., 1992, DeLeon and Iwata, 1996). Early applications of preference assessments most often involved with atypical developing populations experiencing developmental or cognitive disabilities (Fisher et al., 1992; Pace, Ivancic, Edwards, Iwata, & Page, 1985) and individuals with emotional-behavioral disorders (Paramore & Higbee, 2005). However, there is more limited literature regarding implementations of preference assessments with typically developing youth and in broader community-based settings.

Preference assessments can be "efficient procedure[s] for identifying potential reinforcers from a large number of stimuli…" (Piazza, Fisher, Hagpoian, Bowman, & Toole, 1996). Examples of potential reinforcers within an array of stimuli can include items (e.g. toys), activities (e.g. playing cards), or contexts (e.g. time outdoors). Potential reinforcers are identified "through direct observation of a selection between two or more alternatives" (Layer, Hanley, Heal, & Tiger, 2008). Once preferences are identified, then reinforcer assessments are conducted to determine "the extent to which those stimuli increase [or decrease] the occurrence of the targeted behaviors when provided contingently" (Hagopian, Long, & Rush, 2004). That is, reinforcer assessments validate the results of preference assessments (e.g., establishing predictive validity of preference assessments). Knowledge regarding preferred items, activities, or contexts that appropriately serves as a reinforcer for an individual gives practitioners an advantage in program development.

Preference assessments have been used to help "establish or maintain socially desirable outcomes" (Pace, Ivancic, Edwards, Iwata, Page, 1985) by increasing or decreasing occurrences of targeted behaviors (e.g. behavior management). Examples of some targeted behaviors for which preference assessments have been used to inform behavior programming include academic work (Fantuzzo, Rohrbeck, Hightower, & Work, 1991), youths' skill acquisition (Graff & Kersten, 2012), and on-task behaviors (Paramore & Higbee, 2005). Preference assessments have also been used to target behavior programs relating to nutrition and physical activity. Such programs include increasing fruit and vegetable consumption among preschool children (Carraway-Stage, Spangler, Borges, & Goddell, 2014; Jaramillo et al., 2006) and increasing adult physical activity (Rogers, Markwell, Verhulst, McAuley, & Coumeya, 2009). Currently, there is limited research involving the use of preference assessment to increase and maintain participation in physical activity with older children and youth (e.g., Hustyi, Normand, & Larson, 2011).

Overview of Preference Assessment Methods

There have been different methods for attaining client input on preferences, beginning with reinforcer surveys via verbal self-reports (e.g. Risley & Hart, 1968). Reinforcer surveys are self-reports provided by the client around whom the intervention is centered that are used to identify potential reinforcers. However, research of numerous studies have suggested "poor correspondence between verbal self-reports and subsequent behavior" (Northup, 2000; see also Bernstein & Michael, 1990; Northup, Jones, Broussard, & Vollmer, 1996). Further, Pace, Ivancic, Edwards, Iwata, & Page (1985) noted that "defective stimulus selection" (p. 249) results in failures to produce behavior change. For example, asking youth what their preferences are may not prompt them to think of other stimuli options that could be available in a provided

program. Research also has noted that more attention should be focused on determining formal methods for identifying participants' reinforcers beyond "asking them what they prefer" (Pace, Ivancic, Edwards, Iwata, & Page, 1985). Therefore, the need for more accurate preference assessment methodologies to identify preferred items was noted (Pace et al., 1985).

Determining preferred stimuli has also been done by asking clients to rank-order a list of stimuli from most to least preferred (Cooper, Heron, & Heward, 2007). This method, however, poses problems for clients with limited language skills. Alternatively, another method of determining the preferences of these clients was to directly observe the client interact with stimuli. Preference was assessed by measuring how long the client interacted with a given stimulus. Although successful in identifying preferred stimuli, the disadvantage of this method is the length of time required to complete the assessment.

Extending beyond reinforcer surveys and direct observations, preference assessments began to include the presentation of various stimuli to clients, from which the client can select his/her preferred item(s) from an array (See Pace et al., 1985). Early preference assessments often involved various types of stimuli including olfactory (e.g., potpourri), gustatory (e.g., food/drink), visual (e.g., mirror), tactile (e.g., toys), thermal (e.g., heating pads), vestibular (e.g., rocking in a rocking chair), auditory (e.g., music), and social (e.g., hugs from researchers) items (see Mason et al., 1989). However, individual preferences "were chosen for their general accessibility and ease of presentation" (Pace et al. 1985; Datillo, 1986; Mason, McGee, Farmer-Dougan, & Risley, 1989). Alternatively, researchers conducted preference assessment utilizing pictures (e.g., Graff & Gibson, 2003). This methodology extends beyond the previously mentioned preference assessment implementation by allowing the "assessment of items that may

not be presented directly to the participant, such as…going to the park [and] they may save time or money" (Groskreutz & Graff, 2009).

Single stimulus preference assessment. Researchers have developed various ways to implement preference assessments through single stimulus presentations, paired stimulus presentations, multiple stimulus with replacement, and multiple stimulus without replacement methods. Single stimulus preference assessment studies, such as Pace et al. (1985), was implemented with six atypically developing youth (ages 3 to 18 years). Pace et al. (1985) included 16 edible and leisure stimuli. The single stimulus (SS) preference assessment procedure consisted of the presentation of one stimuli at a time. The item was deemed preferred if the client approached the item within five seconds of its presentation (termed "the occasion to respond" [p. 250]). After approaching the item, it was made available to the client for an additional five seconds. If the client did not respond to the item within the allotted five seconds, a prompt was provided to sample the item to ensure that the client's "lack of 'preference' was not solely a function of unfamiliarity with the stimulus" (p. 250).

Pace et al. (1985) measured preference based on the occurrence and nonoccurrence of approaching the item. Researchers found that the participants "differentially approached the assessment stimuli" (p. 251), and that responding occurred uniquely for each participant, deeming this procedure as "effective in identifying reinforcing stimuli" (p. 254) for the targeted population, which was noted to be associated with changes in target behaviors (Pace et al., 1985). However, a potential limitation to the SS presentation is that all stimuli approached are deemed preferred, "making it difficult to differentiate among stimuli" (Fisher, Piazza, Bowman, Hagopian, Owens, & Slevin, 1992). This may be due to the single presentation of stimuli, versus having an option to choose an alternative (p. 494).

Paired stimulus preference assessment. Fisher et al. (1992) modified the SS format into a forced choice format, otherwise known as paired stimulus (PS). In the PS assessment, items are presented to participants in pairs. Researchers utilized the same stimuli that were included in the Pace et al. (1985) study. Implementation of the PS assessment included the pairing of each stimulus with the other stimuli. For example, the 16 stimuli utilized by Fisher et al. (1992) totaled 120 stimulus pair presentations. If a client approached one stimulus out of the pair, that item was made available for an additional five seconds while the other item was removed. Stimuli that were selected on at least 80% of the presentation trials were deemed highly preferred.

According to researchers, the PS format initially showed notable concurrent validity when compared with the SS method. Also, the PS format is able to show levels of stimulus preferences (e.g., medium and low preferred), while the SS shows just whether or not stimuli are preferred. One potential disadvantage to the PS format, however, could be the amount of time needed to implement the assessment and analyze assessment results.

Multiple stimulus with replacement preference assessment. A variation to the PS format was conducted by Windsor, Piché, & Locke (1994), termed the Multiple Stimulus (MS) preference assessment (originally termed grouped presentation). This preference assessment includes displaying all stimuli at one time (e.g. evenly distributed on a table) to the client. Clients were given 20 seconds to make a selection, in which researchers would record the client's selection. If the client did not respond in 20 seconds (or if the client pushed the items away), a "no response" (p. 445) was recorded.

Windsor et al. (1994) included six items in the array of stimuli. The items were presented simultaneously to each client ten times. Each item was replaced and presented in the next array

following its selection. Preferences were identified by determining the percentage based on the number of times that each item was selected from the number of times the item was available or presented in the array. Researchers compared this MS method to the PS method. It was determined that the "[MS format] had the advantage of a shorter administration time" (p. 452). However, authors noted that "because the [MS format] allows access to all items at one time, a preferred item(s) may be selected almost exclusively" (p. 452), as with the SS method. DeLeon and Iwata (1996) further described these findings: "…the PS method resulted in a more distinct ranking of the items than did the MS method" (p. 520). Further, the PS method produced more consistent results than the MS method.

Multiple stimulus without replacement preference assessment. DeLeon and Iwata (1996) combined the PS format and the MS format. The modified preference assessment format, termed multiple stimulus without replacement (MSWO) involves the client selecting an item from an array. However, following the selection, the item is no longer included in the next presentation of all remaining items in the array. This format entails selecting items until no more remain in the array, "a feature that was responsible for the more distinct rankings in the PS method" (p. 520).

DeLeon and Iwata (1996) included seven items in the initial MSWO assessment. Similar to the MS procedure (see Windsor et al., 1994), clients were given 30 seconds to select an item from the array. Contact with the item was recorded as a selection, and the client was given 30-second access to the item. The item was then removed from the array and the next presentation followed with the remaining items.

The MSWO procedure was implemented and compared to the PS and MS methods. Researchers found that "the three assessment formats produced similar results in identifying the

most preferred stimuli" (DeLeon & Iwata, 1996, p. 526), with both the MS and MSWO formats requiring less time to implement. One advantage of the MSWO procedure is the identification of more reinforcers (when applied to behavior change programming) than the MS format. Further, the MSWO format produced similar results in regard to the consistency of ranking selected items as the PS format. Researchers concluded that the "MSWO procedure appears to share the respective advantages of the other two procedures" (p. 528). Researchers also noted that one disadvantage of the MSWO procedure is limitations for the amount of items that can be included in the array, due to position biases (e.g., client having to exert more effort for items placed on the ends of the array).

Gaps in adopting preference assessments in community-based programs. There has been limited adoption of preference assessment methods, aside from fields working with individuals with disabilities and with children in early childhood education. Preference assessments have characteristically steered towards atypically developing populations (e.g., Pace et al. 1985; Green et al. 1991; Fisher et al., 1992; Paclawskyj & Vollmer, 1995; DeLeon & Iwata, 1996; Roane, Vollmer, Ringdahl, & Marcus, 1998; Paramore & Higbee, 2005) as an approach to achieve client input in behavior modification programming. Preference assessments have been implemented with younger typically developing children often in the classroom setting (Hanley, Cammilleri, Tiger, & Ingvarsson, 2007; Jones, Dozier, & Neidert, 2014; Layer, Hanley, Heal, & Tiger, 2008). Although there is limited literature regarding the implementation of preference assessments with typically developing youth outside of educational settings, specifically to promote health behaviors (e.g., Wilson, et al., 2005; Nemet et al., 2012). The integration of the preference assessment methods are not widely utilized across other fields, particularly in areas related to youth programming.

Preference assessments can enhance behavior programming if they are easily administered and can be conducted flexibly. Even with the current methodologies in conducting preference assessments, it is worth noting that Mason, McGee, Farmer-Dougan, and Risley (1989) recognized the "need to assess reinforcers frequently to prevent satiation and to account for idiosyncratic preferences across time" (p. 177). In previous studies (e.g. Farmer-Dougan and McGee, 1986), it was also acknowledged that participants' preferences changed daily and "across sessions and teachers" (p. 172). Therefore, a "daily pre-session mini-assessment" (p. 174) in combination with the comprehensive reinforcer assessment was conducted as a part of the study (see Pace et al, 1985). Other studies continued to integrate the pre-session mini assessments as an approach to continuously assess preferences over time. Mason et al. (1989) were successful in identifying reinforcers that improved the behaviors targeted in their study by implementing the pre-session mini assessments. The assessments not only yielded items that participants deemed to be preferred, but also showed that preferences were altered over the course of one month. Although the implementation of pre-session mini assessments can be quick and effective in improving targeted behaviors (Mason et al., 1989), the current study included only three participants. Therefore, a way to implement pre-session mini assessments with larger groups of participants can also be beneficial.

Computerized technology. In the empirical literature, there has been modest use of computerized technology to conduct preference assessments. In an early application, Dattilo (1985) used a computerized program to "identify indications of preferences through modes of communication that may not include speech" (p. 445), and to show that those with impaired motor capabilities "can indicate consistent and reliable individual preferences among choices" (p. 445). In more recent, applications of preference assessments in other disciplines, Jaramillo,

Yang, Hyghes, Fisher, Morales, and Nicklas (2006) utilized a computerized measurement system for assessing healthy food preferences in typically developing preschool children. This preference assessment had the functionality to be implemented across 198 youth in different Head Start Centers across the United States. This assessment provided a reliable and valid measure of determining healthy food preferences in preschool children, however it is tailored to preschool age children and is limited to only food items.

In practice, the integration of computerized assessments for identifying preferences of individuals with autism has been used by practitioners. In 2010, Touch Autism was created to determine clients' preferences quickly and accurately via an internet-based Apple (iPad, iPhone) application (www.touchautism.com). The strengths of this application are its usability in multiple locations (e.g., home, school) and its automatic generation of the user's preference assessment data, which make it more likely to be used not only by professionals, but also by caregivers. However, the computer application is specific for identifying preferences for individuals with autism, which limits the use of the technology with typically developing populations.

Currently, computerized technologies that are designed for identifying preferred items in older typically developing youth are limited. More specifically, it may be beneficial to identify technology-based methods for identifying and promoting health behaviors of youth, such as participation in physical activities. There is a need to develop modernized and efficient capabilities to assess not only food selection, but also preferred healthy, leisure activities to inform healthy behavior programming for youth (see Baird, 2009). Computerized preference assessment technology may enhance the utility and adoption of assessment methodologies by permitting use with more diverse populations (e.g., youth, parents) and access to immediate data compilation and analysis of preference assessment results (e.g., Touch Autism). Furthermore, the

use of computer-based preference assessments may enhance use of the methodology across naturalistic settings in which youth are engaged such as homes, community centers (e.g., Boys and Girls Clubs), and schools.

Purpose of Present Study

The purpose of the present study is to evaluate the use of the Assessment of Preferred Leisure Alternatives for Youth (A-PLAY), a web-based computer application, to identify preferences of typically developing youth, ages eight to 14 years. The A-PLAY uses a computerized pictorial assessment to identify preferred types of physical activities (e.g. soccer, basketball, football) for typically developing youth using the Rank Order (Cooper, Heron, & Heward, 2007), Paired-Choice (Fisher et al., 1992;Northup, George, Joes, Broussard, & Vollmer, 1996), and Multiple Stimulus without Replacement (MSWO) preference assessment methodologies. The study aims are: (a) to identify preferred activities of those youth who completed the assessments in order to inform site programming, (b) to compare individual participant results across methodologies and over time, and (c) to examine preference selections across different methodologies. Specifically, the three research questions that guide the study are:

(1) What were the highly preferred physical activities identified by youth in each neighborhood site?

(2) Did youth participants reliably select preferred types of physical activities using the A-PLAY?

(3) Is the selection of highly preferred types of physical activities by youth participants similar across preference assessment methodologies?

Methods

Partners and Settings

The Assessment of Preferred Leisure Alternatives for Youth (A-PLAY) was implemented with youth from two community-based partner groups including the Full Circle Youth Program and the Foxmoor Neighborhood Association. The A-PLAY was administered by staff and volunteers of the community-based programs and with graduate and undergraduate research assistants from the KU Work Group Community Youth Development and Prevention Team (CYDPT) at the University of Kansas. All researchers involved in administering and analyzing A-PLAY data were provided with training that included the purpose of A-PLAY and how it is implemented. Further, all researchers were required to complete all of the assessments in the application to gain familiarity with the tool. Prior to implementation, the University of Kansas' Institutional Review Board reviewed and approved all the study's instruments and protocols.

Full Circle Youth Program. The Full Circle Youth Program is a resident service provided by the Lawrence Douglas County Housing Authority, and serves youth who live at Edgewood Homes in Lawrence, Kansas. As of 2012, 137 youth resided at Edgewood Homes (Lawrence Douglas County Housing Authority, 2012). The Full Circle Youth Program provides programming services to children residing in the housing complex and is available for youth residents to attend at their leisure from 3:00 pm to 6:00 pm on Mondays through Fridays. One component of the Full Circle Youth program is the Zoning Outside Movement Body Image Ingredients Exercise (ZOMBIE) program, which "encourages youth…to participate in [healthy] activities that are easy to incorporate into every day routines and are geographically accessible" (Lawrence Douglas County Housing Authority, 2012). The Full Circle Youth Program at Edgewood Homes was selected as a partner site for this study because of the interest of program

staff in increasing youth participation in physical activities. The A-PLAY was administered to youth in the Babara Huppee Community Facility's computer lab, located in the Edgewood Homes' housing complex.

Incredible Foxes neighborhood youth group. The Foxmoor Neighborhood Association serves nearly 200 residents of the Foxmoor Neighborhood in Kansas City, Kansas. Approximately, 38% of the neighborhood residents are less than 17 years of age. The Foxmoor Neighborhood Association has a youth group, The Incredible Foxes, from which the study participants were recruited. The Incredible Foxes meet monthly to provide structured leisure-time physical activity opportunities for the youth group members. Youth from the Incredible Foxes were invited to participate in the study since it was a goal of the neighborhood association to identify and provide types of physical activities that the youth were interested in participating.

Study Participants

Participants of the study consisted of 14 typically developing youth between the ages of seven to 14 years. There were ten youth participants from the Full Circle Youth Program and four from the Foxmoor Neighborhood Association. All of the names within the current study have been changed in order to maintain participant anonymity. All of the study participants completed minimally one preference assessment method at least twice.

Prior to implementing the A-PLAY, parental consent (see Appendix A) was obtained for participants under the age of 18. In order to complete the assessment, a web-based registration through the A-PLAY application was required. The registration prompted for the potential participants' name, age, gender, school, and organization affiliation (e.g., Edgewood Homes). Each participant provided the requested information on paper forms. CYDPT researchers entered the information from the paper forms into the A-PLAY's registration page and assigned

usernames and passwords. Once the usernames and passwords were assigned, participants were then given access to the A-PLAY. Prior to accessing the A-PLAY assessments, CYDPT researchers read a brief assent statement to each participant (see Appendix B). The assent included a brief description of the A-PLAY tool, the purpose for identifying preferred physical activities, and an opportunity for participants to declare whether or not they are willing to complete the A-PLAY assessments.

Materials and Computer Application

The A-PLAY is a web-based application (www.aplay.co), which supports administering the preference assessment methods using pictorial presentations of different types of physical activities. The assessment tool was developed by the CYDPT in partnership with the Information and Telecommunication Technology Center (ITTC), and the Life Spans Institute's Research Design and Analysis unit, all from the University of Kansas.

Description of the A-PLAY application. The A-PLAY is a web-based application that presents visual stimuli or pictorial presentations of different types of physical activities (e.g., basketball, volleyball) using various preference assessment methods (see Appendices C-G). The application includes 32 non-copyright images of different types of physical activities. The types of physical activities included in the A-PLAY application were identified based on activities included in the System for Observing Play and Recreation in Communities (SOPARC) (McKenzie et al., 2006), a validated and widely accepted physical activity assessment tool for community-based settings. Additional physical activity items were included based on the Physical Activity Resource Assessment (PARA) (Lee et al., 2005), an assessment tool that aids in determining available physical activity resources in a given area. Researchers conducted the PARA at Edgewood Homes to ensure all possible activities available at the site were included in

the A-PLAY application. The researchers endeavored to ensure a wide array of physical activity options that could be included in the application based on what was available, or potentially accessible within close proximity of the study sites.

The A-PLAY application includes options to display the names of activities and participants have the option to hover over an image, in which the name of the activity appears in a text box. Pictures also could be viewed in larger displays by mouse clicking directly on the picture. Due to the large number of physical activity items in the Activity Participation Survey, Rank Order assessment, and MSWO assessment, the screen width and height were able to be adjusted to allow the pictures to be displayed on the screen. In instances that all pictures could not be displayed simultaneously due to computer settings, researchers provided an oral prompt to remind the respondent to use the mouse to scroll down (or use the down arrow) to view all pictures in the assessment. Each assessment is time stamped and records the duration of the trial, including the start and completion time. Instructions for completing each assessment were provided on the web page for each preference assessment, and researchers were available if the instructions on the web page were unclear.

After completing the computerized assessment, the application provides automated data displays of the results in graph and/or table formats (see Appendix H). The application also provides the ability to obtain the data in an exportable Microsoft Excel® file. The data graphs and exports were not available to the participants during the study. The paired choice assessments were the only methods for which a summary table was provided after completing the assessment, due to the length of time required to complete the method.

Materials and equipment. Both partner sites had similar materials available to support the administration of the A-PLAY. The materials used in conducting the A-PLAY included the

following: desktop or laptop computers with internet access, accompanying keyboard and mouse per computer, and chairs at every computer. The A-PLAY can be completed on desktop and laptop computers that are internet accessible. Currently, the internet browsers that best support the A-PLAY are Google Chrome and Mozilla Firefox. At the Edgewood Home site, the computer lab consisted of eight internet accessible desktop computers that were available for youth to use. Each computer was spaced approximately two feet apart. At the Foxmoor Neighborhood Association study site, the A-PLAY was conducted from a neighborhood-based location that was internet accessible and provided two desktop and three laptop computers. User names and passwords were required and provided by the researchers to each study participant who completed the A-PLAY application.

Study Procedures

The A-PLAY was administered between June 2013 and May 2014. Participants completed the preference assessments at least twice. Researchers provided verbal instructions to each participant prior to conducting the assessment and were also available during the administration of the A-PLAY to answer questions. Participants had the option to complete all assessment methods during a session. A 15-minute delay was required between sessions if completing the same methodology more than once. To determine the reliability of the A-PLAY instrument, participants were given the opportunity to complete multiple trials of the same method within a session. Also, participants could complete multiple sessions over the 12-month study period. To determine the reliability of the assessment instrument, participants completed multiple assessment methods (e.g., paired choice, multiple stimulus without replacement) per session. Upon completing a session, participants were each awarded $5 Wal-Mart gift cards.

A-PLAY assessments

There are five assessments that can be completed through the A-PLAY including one survey of weekly physical activity participation and four preference assessments. The preference assessments utilized in the A-PLAY are rank order (Cooper, Herron, & Heward, 2007), paired choice (Fisher et al., 1992), and multiple stimulus without replacement (MSWO) (DeLeon & Iwata, 1996). The A-PLAY also includes categorized paired choice (Northup, George, Jones, Broussard, & Vollmer, 1996) assessments, a version of the paired choice assessment that includes stimuli grouped into similar stimulus classes. Each preference assessment methodology, except the categorized paired choice assessments, includes 32 physical activities (see Appendix I). The categorized paired choice assessments are divided into four categories that include fewer activities than the aforementioned assessments: One person activities (16 activities); 2 or more person activities (15 activities); Activities with a ball (13 activities); and, Activities without a ball (18 activities). All activities in each of the assessments were randomly presented and displayed across participants and different assessment methods.

Activity participation survey. The first assessment presented in the A-PLAY is the Activity Participation survey. The survey prompts participants to select all of the activities that the respondent was engaged in during the past seven days ("Check any activities that you have done in the past seven days [week]") (see Appendix C). In the survey, all 32 pictures are presented at once and arranged in random order on the screen. To view all of the pictures, participants were prompted to scroll down (or use the down arrow) until no further pictures were included, as noted above. Each picture included a check box in the lower middle area of the picture for participants to select and place a check mark (via mouse click). A checked picture indicated that the activity was engaged in during the past week (See Appendix C). The activity

participation survey served two primary functions: To determine activities youth participated in during the past seven days, and to allow youth to review and familiarize themselves with all of the displayed physical activities (e.g., by hovering over) before completing the actual preference assessments. Following the Activity Participation assessment, participants then completed the preference assessments.

Rank order assessment. The rank order assessment displays all 32 picture items simultaneously on the screen in one panel (see Appendix D). The participant is asked to order the picture items in the panel from the most to least preferred activity. The most preferred activity is dragged and dropped into the top left area of the panel. The second most preferred activity is dragged and dropped to the right of the most preferred activity. This process continues until the array of picture items are arranged in order from most preferred activity (top left) to the least preferred activity (bottom right), which will be the last picture item in the array. The application prompts participants to review all of the pictures in the order in which they were arranged prior to saving the responses. The pictures can continue to be manipulated after placement until the save button is clicked. Researchers provided a follow-up prompt to review all of the pictures prior to saving.

Multiple stimulus without replacement (MSWO) assessment. The multiple stimulus without replacement (MSWO) assessment arranges all 32 pictures in a random order in the first panel box on the left side of the computer. On the right side of the computer screen, there is second panel box that is empty and does not contain any pictures (see Appendix E). The participant is prompted to review all of the 32 pictures displayed in the left panel. After reviewing the activities, the written instructions prompts the participant to select the most preferred activity and place the selected picture (drag and drop using the mouse) into the panel

on the right side of the screen. The participant then selects the picture of his/her second most preferred activity from the left panel and places the picture into the box in the right panel. The respondent continues to select pictures in order of preference (from most preferred to least preferred) until all of the activities located in the left panel are placed in the right panel in order of preference. Once a picture is placed in the right panel, that picture cannot be rearranged or manipulated. If a participant mistakenly places the wrong picture in the right panel (e.g., the chosen activity may be the participant's third preference, but was selected as the second preference), then the participant has to restart the assessment.

Paired choice assessment. In the paired choice assessment, each picture is randomly paired individually with each of the remaining 31 items in the picture array. Two activities are presented to the participant in a side-by-side (paired) presentation (see Appendix F). The participant is prompted to select or click the mouse on the preferred activity. Once an activity is selected, two more paired activities are presented. The respondent selects the preferred activity from the paired presentation. The dual pairing of pictorial stimuli is continued until each of the 32 items has been randomly paired.

Categorized paired choice assessment. Categorized paired-choice is the final assessment, which uses the paired choice assessment format, but presents activities in the following categories: (a) activities with a ball (includes 13 items), (b) activities without a ball (includes 18 items), (c) one-person activities (includes 16 activities), and (d) two or more person team activities involving (includes 15 activities). The participant is directed to select one or more categories (see Appendix G). Once a category is selected, the participant then completes the paired-choice procedures for the selected category.

Response Measurement

A session is defined as the duration of time from when a participant logs on and logs off or exits the A-PLAY application. Therefore, each time a participant signs into the A-PLAY application with their username and password is considered a session. A trial starts when the respondent begins to complete an assessment method. The trial ends upon completion of the assessment method.

A response or preference selection is based upon instances of a participant clicking on a picture (e.g., for paired choice assessments and activity participation) or dragging and dropping a picture (e.g., for rank order and MSWO assessments). Each assessment trial ends when the "save choices" button is selected using the mouse. Since the paired choice and categorized paired choice assessments require more time to complete, participants can select the "pause" button to momentarily suspend the trial, but must complete the trial within the same session.

Analysis

The preference assessment rankings for the Rank Order and MSWO assessments were based on the order in which the items were ranked by the participants. The A-PLAY application was designed to automatically assign rankings to physical activities based on the placement of the picture stimulus (Rank Order) and by the order in which a picture stimulus was selected (MSWO). The MSWO and rank order assessments were calculated as a percentage of the number of times the item was selected (e.g., the numerator was always one since the item could only be selected once from the array) divided by the numerical value of the rank order of the activity.

The Paired Stimulus assessments' preferences were reported as percentages and calculated as the number of times an activity was chosen or selected divided by the number of

instances or times the item was available and presented in the pictorial array to be selected. Rankings for this assessment, similar to the Rank Order, were based on numerical rank in the order in which activities were chosen (or selected) per presentation in the pictorial array (e.g., the activity with the highest percentage was ranked number one, deeming the activity the most preferred).

Piazza, et al. (1996) identified highly preferred activities based on quartiles or the top 25% of activities ranked or with the highest percentage scores. In the current study, highly preferred activities are determined by dividing the number of activities in each assessment by four. For example, the paired stimulus assessment includes 32 total activities; therefore, the eight highest ranked activities would be the most highly preferred. If ties occur within the PS and CPS assessments, the identically ranked activities are paired together until a preference is established.

Statistical analyses. The Kendall rank-order correlation ($\tau = [C - D] / [1/2]n [n - 1]$) was used to determine the test-retest reliability between same assessment preference assessment methodologies (e.g., at least two trials of the PS assessment). The Kendall rank-order correlation ($\tau = [C - D] / [1/2]n [n - 1]$) was also utilized to determine concurrent validity across the MSWO and PS preference assessments completed within the same session. Researchers concluded that *p* values less than or equal to .05 were statistically significant. Four (out of 14) participants were not included in the statistical analysis due to their incompletion of multiple trials of the same assessment methodology (to determine test-retest reliability), and incompletion of the MSWO and PS preference assessments within the same session (to determine concurrent validity).

Results

Table 1 presents the number and demographic description of participants who completed the A-PLAY. Overall, 14 youth completed the A-PLAY. Ten youth (71%) resided in Edgewood

Homes, while the remaining four youth (29%) resided in the Foxmoor neighborhood. Sixty-four percent of the total youth were African-American, 7% were Hispanic, and 7% were White. Fourteen percent of youth designated themselves as "other," while 7% chose not to designate themselves in a race category. Approximately, 79% of the overall study participants were females, and 21% were males. Half of the participants were aged ten and under at the time of study, while the remaining 50% were 11 to 14 years.

Table 1

Participant Demographics

Demographic Characteristics		**Edgewood Homes (N = 10)** ***71%***	**Foxmoor Neighborhood (N = 4)** ***29%***	**Total Youth Participants** ***(N = 14)***
Race	African-American	5 *50%*	4 *100%*	**9** ***64%***
	Hispanic	1 *10%*	0	**1** ***7%***
	White	1 *10%*	0	**1** ***7%***
	Other	2 *20%*	0	**2** ***14%***
	Unknown	1 *10%*	0	**1** ***7%***
Gender	Males	2 *20%*	1 *25%*	**3** ***21%***
	Females	8 *80%*	3 *75%*	**11** ***79%***
Age	10 and under	8 *80%*	1 *25%*	**9** ***64%***
	11 and over	2 *20%*	3 *75%*	**5** ***36%***

Youth Participation in Physical Activities

The Activity Participation Survey was completed by six participants (Edgewood, n = 2; Foxmoor, n = 4) who completed the assessment between March and May 2014. Data are only included for a sample of youth who completed later assessments due to technical errors with the

earlier version of the application. On average, the participants (N = 6) participated in nine activities (M = 9.33) in the seven days prior to completing the assessment (see Table 2). Across

Table 2

Youths' Participation in Activities Prior to Preference Assessment Completion

Participant **(Neighborhood site)**	Date of Completion and Activities Participated			
Alex		3/28/14		
(Edgewood)	Baseball	Swimming	Football	Street Hockey
	Dodge Ball	Treadmill	Kickball	Trampoline
	Golf	Wall Ball	Rock Climbing	Volleyball
	Obstacle Course	Basketball	Roller Skating	Working out on Exercise Equipment (EE)
	Soccer			
Amy		4/26/14		
(Foxmoor)	Dancing	Obstacle Course	Football	Jump Rope
	Gymnastics			
		5/17/14		
	Dancing	Gymnastics		
Devin		5/17/14		
(Foxmoor)	Baseball	Dancing	Weight Lifting	Running
	Basketball	Dodge Ball	Jump Rope	Wii Fit®
	Boxing			
		5/23/14		
	Basketball	Dancing	Golf	Weight Lifting
Jada		3/28/14		
(Edgewood)	Badminton	Boxing	Dancing	Football
	Rock Climbing	Trampoline	Volleyball	Working out on EE
MaShayla		4/26/14		
(Foxmoor)	Baseball	Basketball	Running	Soccer
	Gymnastics	Kickball	Football	
	Trampoline	Dancing		
Mikka		5/23/14		
(Foxmoor)	Football			

Note. EE = Exercise Equipment

Edgewood, 33% of the same physical activities were participated in by both participants (n = 2), which were football, rock climbing, trampoline, volleyball, and working out on exercise equipment. Across Foxmoor, none of the youth participated in the same types of physical activities (n = 4). Eighty-three percent of total participants (n = 5) engaged in football, the

highest participated physical activity. Sixty-seven percent of the participants across both neighborhood sites engaged in dancing (n = 4). The lowest participated activities were badminton, roller skating, running, street hockey, swimming, treadmill, and wall ball (each engaged in by 17% [n = 1] of total participants). No youth across both neighborhood sites participated in bicycling, frisbee, ping pong, tag, tennis, tether ball, or yoga.

Highly Preferred Physical Activities for Youth in Neighborhood Sites

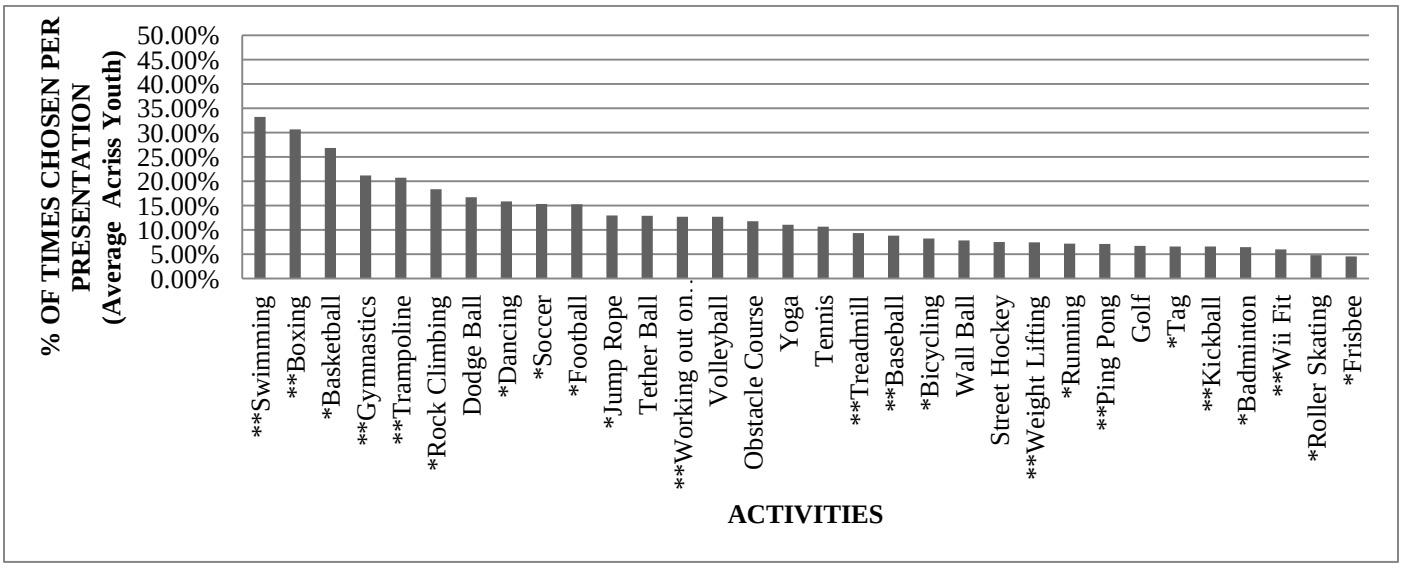
Eleven total youth completed the MSWO assessment. Among the youth residing in Edgewood Homes (n = 7), the highest preferred physical activities were swimming (chosen 33.18% times per presentation), boxing (30.63%), basketball (26.86%), gymnastics (21.15%, trampoline (20.73%), rock climbing (18.33%), dodge ball, (16.73%), and dancing (15.83%) (see Figure 1). Basketball, rock climbing, and dancing are readily available activities located at the Edgewood Homes site. Swimming, boxing, gymnastics, and trampoline are accessible through the program's transportation or within an approximately two mile radius.

The highest preferred physical activities for youth residing in the Foxmoor neighborhood (n = 4) were gymnastics (45.56%), swimming (35.79%), trampoline (30.05%), boxing (28.12%), basketball (27.02%), weight lifting (16.22%), Wii Fit® (14.63%), and football (11.37%). The MSWO methodology was used to describe the overall highest preferences of youth at both sites as it was the method with the highest participant completion rate (see Figure 2).

Test-Retest Reliability Study Results

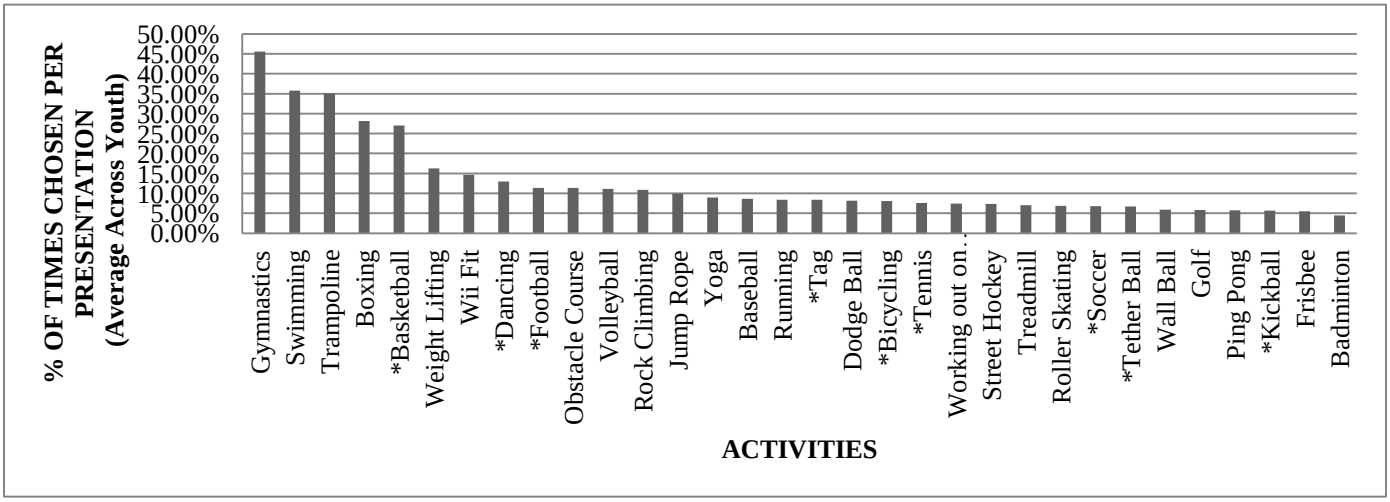
Test-retest reliability within a session. Table 3 shows the Kendall rank-order correlations (τ) to determine the test-retest reliability of assessments completed twice within the same session. Overall, ten assessment trials were completed in total by study participants to examine test-retest reliability. The activity rankings for each participant are included in

Figure 1. Preferred Activities of Edgewood Homes Youth



Note. *= Available activities on site; **= Accessible activities located offsite within walking distance

Figure 2. Preferred Activities of Foxmoor Youth



Note. *= Available activities on site; **= Accessible activities located offsite within walking distance

Appendix J for PS and MSWO assessments and in Appendix K for the CPS assessments.

One participant completed two trials to examine the Categorized Paired Stimulus (CPS) test-retest reliability. Three participants completed the Multiple Stimulus without Replacement (MSWO) methodologies at least twice (two trials) in one session. For the Categorized Paired

Stimulus (CPS) assessment, there were six trials completed by five participants (one participant completed an additional trial). As shown in Table 3, there were positive significant findings for nearly all the test-retest trials across assessment methods.

Table 3

Kendall Rank-Order Correlations within Same-Session Assessments (32 items in array)

Participant	PS – PS correlation (N = 1)	MSWO – MSWO correlation (N = 3)	CPS – CPS correlation (N = 6)
Amy	.774***	--	.638^^***
Calvin	--	--	.821°***
Devin	--	.506**	--
Kyla	--	--	.667^*** .543^^**
MaShayla	--	.628***	--
Mikka	--	.179	.717^***
Rachael	--	--	.638^^***

Note. PS (Paired Stimulus); CPS (Categorized Paired Stimulus); RO (Rank Order); MSWO (Multiple Stimulus without Replacement. For the categorized paired choice assessment, types of categories are indicated by ^=1 Person Activities, ^^ =2+Person Activities, ° = Activities with a Ball, °°=Activities without a Ball

***** $p < .05$; **<.01;***≤.001

Paired stimulus test-retest reliability within one session. Based on the Kendall rank-order Correlation, there was a strong positive correlation found between Amy's two PS assessment trials ($r_s[30] = .774$; $p = \leq .001$). Table 4 summarizes the rank order for the highly preferred (e.g., top eight) physical activity items in the array for the participant. Seven of the eight (87.5%) top ranked activities remained highly preferred across both trials. Appendix J provides the ranking of all items presented in the array (n = 32) for both PS trials.

MSWO test-retest reliability within one session. There were positive significant findings for both Devin ($r_s[30] = .506$; $p = <.01$) and MaShayla ($r_s[30] = .628$; $p = \leq .001$), who had the highest correlation of the three participants completing the MSWO assessment for test-retest reliability. Appendix J shows the rank order for each physical activity item in the array for each

participant completing multiple MSWO trials. Six out of eight (75%) of Devin's highly preferred physical activities remained highly preferred across trials, while his top two preferred activities remained constant across both trials. Five out of eight (63%) of MaShayla's highly preferred physical activities remained highly across both trials.

Table 4

Test-Retest Highest of Preferred Rankings for the Paired Stimulus (PS) Assessment (32 items in array)

Rank Order for PS Assessment	**Amy**	
	TIME 1	T2
1	Gymnastics	Wii Fit
2	Jump Rope	Swimming
3	Trampoline	Gymnastics
4	Wii Fit®	Trampoline
5	Yoga	Jump Rope
6	Dodge Ball	Rock Climbing
7	Rock Climbing	Yoga
8	Swimming	Dancing

Mikka had a low correlation ($r_s[30] = .179$; $p = .270$) of consistent preference selection of the 32 items in the array across the two MSWO trials. Three out of eight (38%) of Mikka's highly preferred physical activities remained highly preferred across both trials. Her highest preferred activity was consistent across both trials, and the three highest preferences were selected in both trials, although there was some placement shifts in the second and third ranked activities (see Appendix J). Table 5 summarizes the rank order for the highly preferred (e.g., top eight) physical activity items in the array for Devin, MaShayla, and Mikka.

Categorized paired stimulus test-retest reliability within one session. As shown in Table 3, the test-retest reliability was significant for all six CPS trials. The highest correlation was observed for Calvin ($r_s[11] = .821$; $p = \leq .001$) for the activities with a ball categorized paired

stimulus assessment. Tables 6, 7, and 8 display the highly preferred physical activity items for each participant who completed a CPS assessment. Appendix K provides the ranking of all items presented in the arrays for both the various CPS assessments.

Table 5

Test-Retest Rankings for the MSWO Assessment (32 items in array)

Rank	Devin (MSWO)		MaShayla (MSWO)		Mikka (MSWO)	
	TIME 1	***T2***	***TIME 1***	***T2***	***TIME 1***	***T2***
1	Boxing	Boxing	Basketball	Basketball	Swimming	Swimming
2	Weight Lifting	Weight Lifting	Gymnastics	Gymnastics	Gymnastics	Trampoline
3	Basketball	Football	Running	Volleyball	Trampoline	Gymnastics
4	Trampoline	Basketball	Baseball	Baseball	Jump Rope	Street Hockey
5	Football	Trampoline	Swimming	Dancing	Dodge ball	Bicycling
6	Swimming	Swimming	Volleyball	Trampoline	Wii Fit®	Tetherball
7	Roller Skating	Exercise Equipment	Tennis	Swimming	Football	Weight Lifting
8	Dodge ball	Roller Skating	Trampoline	Soccer	Tag	Tennis

One person activities. Kyla and Mikka completed the one person activities CPS assessment, which included 16 items in the array. There was a positive significant correlation observed for both Mikka ($r_s[14] = .717$; $p \leq .001$) and Kyla ($r_s[14] = .667$; $p \leq .001$). All four (100%) of Mikka's most preferred activities remained the most preferred across both trials. Additionally, there was no variance in rankings of Mikka's most preferred activities across trials. Fifty percent of Kyla's preferred physical activities were consistently selected across both trials, with her highest preferred activity remaining the highest across the subsequent trial (see Table 6).

Two or more person activities. Amy, Kyla, and Rachael completed the two or more person activities CPS Assessment, which included 15 items in the array. All correlations between

trials were positively statistically significant, ranging from $r_s(13) = .543$; $p < .01$ to $r_s(13) = .638$; $p \leq .001$. Two out of four (50%) of Amy and Kyla's highly preferred physical activities remained

Table 6

Test-Retest High Preference Rankings for the CPS Assessment for One Person Activities

Rank	**Mikka (1 Person Activity)**		**Kyla (1 Person Activity)**	
	TIME 1	*T2*	*TIME 1*	*T2*
1	Swimming	Swimming	Trampoline	Trampoline
2	Trampoline	Trampoline	Weight Lifting	Swimming
3	Gymnastics	Gymnastics	Swimming	Jump Rope
4	Obstacle Course	Obstacle Course	Bicycling	Wii Fit®

highly preferred across trials (see Table 7). Amy's highest preferred activity was ranked consistently in the subsequent trial. Three out of four (75%) of Rachael's highly preferred activities remained highly preferred across both trials. Fifty percent of her highest preferred activities remained highest preferred (ranked one and two) across both trials (see Table 7).

Activities with a Ball. Calvin was the only participant to complete the Activities with a Ball assessment twice in one session, and received a positive statistically significant correlation between trials ($r_s[11] = .821; p \leq .001$). There were 13 items included in the array. All four (100%) of Calvin's preferred activities remained the top three preferred activities across trials. The top two of the four activities remained the top two consecutively. Table 8 shows Calvin's preferred physical activities across both trials.

Test-Retest Reliability across Multiple Trials and Sessions

Six participants completed the same assessment multiple times, but during different sessions (i.e., over time). The time period between sessions ranged from six to 393 days. Table 9 displays participants and the associated assessments completed, along with the number of days

Table 7

Test-Retest High Preference Rankings for the CPS Assessment for 2+ Person Activities

Rank	**Amy (2+ Person Activity)**		**Kyla (2+ Person Activity)**		**Rachael (2+ Person Activity)**	
	TIME 1	***T2***	***TIME 1***	***T2***	***TIME 1***	***T2***
1	Tennis	Tennis	Kickball	Badminton	Ping Pong	Ping Pong
2	Wall Ball	Tag	Badminton	Tag	Volleyball	Volleyball
3	Dodge Ball	Volleyball	Tag	Dodge Ball	Kickball	Frisbee
4	Tag	Frisbee	Ping Pong	Soccer	Badminton	Kickball

Table 8

Test-Retest Rankings for the Activities with a Ball CPS Assessment

Rank	**Calvin**	
	Time 1	Time 2
1	Badminton	Badminton
2	Soccer	Soccer
3	Football	Kickball
4	Kickball	Football

(shown in parenthesis) between each assessment session. All correlations show positive statistical significance, ranging from ($r_s[30] = .310$; $p < .05$) to $r_s[13] = .790$; $p \leq .001$).

Rank Order test-retest reliability across sessions. As shown in Table 9, three participants completed the Rank Order (RO) assessment for test-retest reliability across sessions (e.g., different days), in which all received positive statistically significant correlations ranging from ($r_s[30] = .310$; $p < .05$) to $r_s[30] = .617$; $p \leq .001$). Table 10 shows the rank order of highly preferred activities for each participant. Appendix L provides the rank for all 32 items in the array for each participant of the RO sessions, along with the number of days between each session.

Table 9

Kendall Rank-Order Correlations for Assessments Completed Across Time

Participant	RO – RO correlation (n=3)	MSWO – MSWO correlation (n=3)	PS – PS correlation (n=3)	CPS – CPS correlation (n=7)
Alex	.310* *(31 days)*	--	.508* *(321 days)*	.487°°* *(300 days)*
Amy	.617*** *(21 days)*	.589*** *(21 days)*	.540* *(393)*	.633^*** *(371days)*
Annette	--	--	--	.543^^** *(300)*
Devin	.383* (6 days)	.636*** *(6 days)*	--	.750^*** *(6 days)* *.790^^*** (6 days)*
Jada	--	.442** *(21 days)*	--	.641°°*** *(300 days)*
MaShayla	--		.709*** *(6 days)*	.700^^*** *(6 days)*

Note. RO (Rank Order) PS (Paired Stimulus); CPS (Categorized Paired Stimulus); RO (Rank Order); MSWO (Multiple Stimulus without Replacement. For the categorized paired choice assessment, types of categories are indicated by ^=1 Person Activities, ^^ =2+Person Activities, ° = Activities with a Ball, °°=Activities without a Ball
***** p < .05; **<.01;***≤.001

Alex completed two RO assessment trials in two different sessions, spanned 31 days apart. Across both of Alex's RO trials, six out of eight (75%) of her highly preferred physical activities remained highly preferred, with her top two most preferred activities consistently ranked in the top two. The Kendall rank order correlation between Alex' assessments was ($r_s[30] = .310$; $p = .013$).

Amy had the highest correlation of the three participants who completed the RO assessment, ($r_s[30] = .617$; $p < .001$), with 21 days between assessment trials. Across both sessions, five out of eight (63%) of Amy's highly preferred physical activities remained in her top rankings. Her top three preferred activities receiving equivalent rankings across both sessions.

There were six days between Devin's assessment trials. There was a statistically significant correlation between his assessments, (r_s[30]=.383; p =.002). Across both trials, five out of eight (63%) of Devin's highly preferred activities were selected in both sessions. The top two preferred activities remained the top two, receiving equivalent rankings across both assessment sessions.

Table 10

Test-Retest (Across Session) Rankings for the RO Assessments

Rank	**Alex (31 days between)**		**Amy (21 days between)**		**Devin (6 days between)**	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
1	Volleyball	Swimming	Gymnastics	Gymnastics	Boxing	Boxing
2	Swimming	Volleyball	Trampoline	Trampoline	Weight Lifting	Weight Lifting
3	Soccer	Basketball	Wii Fit®	Wii Fit®	Football	Basketball
4	Basketball	Soccer	Obstacle Course	Dancing	Trampoline	Football
5	Treadmill	Weight Lifting	Rock Climbing	Yoga	Roller Skating	Trampoline
6	Weight Lifting	Gymnastics	Jump Rope	Rock Climbing	Frisbee	Rock Climbing
7	Rock Climbing	Baseball	Tennis	Jump Rope	Working out on EE	Working out on EE
8	Baseball	Wall Ball	Wall Ball	Tag	Dancing	Kickball

Note. EE=Exercise Equipment

Paired Stimulus test-retest reliability across sessions. Three participants completed the PS assessment at least two or more times across different sessions, which permitted examining test-retest reliability across time. Table 11 summarizes the most highly preferred activities selected by the participants. Appendix M provides the full ranking for each physical activity item included in the PS assessment. There were 321 days between Alex PS assessment trials. The was a positive and significant correlation between the two assessments (r_s[30]=.508; p =.001). Four

out of eight (50%) of Alex' highly preferred physical activities remained highly preferred across both trials, with her three highest ranked activities selected in both sessions.

There was a 393 days lapse between Amy's first and last PS assessment. This was the longest length of time between both trials for the PS assessment completed in two sessions. There was a positive significant correlation ($r_s[30] = .540$; $p < .001$). Amy's five out of eight (63%) most highly preferred physical activities were selected in both sessions.

There were six days between MaShayla's PS sessions. There was a positive significant association between both sessions ($r_s[30] = .709$; $p < .001$). Seven out of eight (88%) of MaShayla's highly preferred physical activities remained across both trials. Her top two ranked physical activities received equivalent rankings in both trials.

Multiple Paired Stimulus trials for test-retest reliability. Amy completed a total of five paired-stimulus (PS) assessments to determine test-retest reliability across multiple trials and sessions. Table 12 depicts Kendall rank-order correlations across the PS assessment trials and sessions.

Table 11

Test-Retest (Across Session) Rankings for the PS Assessments

Rank	**Alex (321 days between)**		**Amy (393 days between)**		**MaShayla (6 days between)**	
	Initial Assessment	***Final Assessment***	***Initial Assessment***	***Final Assessment***	***Initial Assessment***	***Final Assessment***
1	Swimming	Swimming	Gymnastics	Gymnastics	Basketball	Basketball
2	Basketball	Volleyball	Jump Rope	Wii Fit®	Dancing	Dancing
3	Volleyball	Basketball	Trampoline	Trampoline	Gymnastics	Volleyball
4	Weight Lifting	Soccer	Wii Fit®	Dancing	Trampoline	Running
5	Bicycling	Baseball	Yoga	Rock Climbing	Running	Baseball
6	Treadmill	Gymnastics	Dodge Ball	Tether Ball	Volleyball	Football
7	Trampoline	Football	Rock Climbing	Jump Rope	Baseball	Gymnastics
8	Running	Bicycling	Swimming	Frisbee	Soccer	Trampoline

The Kendall rank-order correlations (τ) compare Time 1 assessment rankings to each of the other four PS assessments completed (e.g., Time 1 to Times 2, 3, 4, and 5). As shown in Table 12, there were positive and significant findings at the $p < .001$ level for all the correlations. The number of days between trials ranged from zero (e.g., same session trials) to 393 days across sessions.

Table 12

Amy's Correlations Across Five Paired Stimulus Assessment Sessions and Trials.

	TIME 1 to TIME 2	TIME 1 to TIME 3	TIME 1 to TIME4	TIME 1 to TIME 5
R_2 Correlation	.774 *(p<.001)*	.621 *(p<.001)*	.601 *(p<.001)*	.540 *(p<.001)*
# of Days between Assessments	0	89	358	393

Note. Dashed lines indicate instances in which the number of days between each trial (T) is unknown
All correlations are significant at the $p < .05$ level

Table 13

Amy's Test-Retest Rankings between PS Assessments Completed across Multiple Sessions

Rank	Time 1	Time 2	Time 3	Time 4	Time 5
1	Gymnastics	Wii Fit®	Swimming	Trampoline	Gymnastics
2	Jump Rope	Swimming	Gymnastics	Gymnastics	Wii Fit®
3	Trampoline	Gymnastics	Rock Climbing	Wii Fit®	Trampoline
4	Wii Fit®	Trampoline	Wii Fit®	Obstacle Course	Dancing
5	Yoga	Jump Rope	Trampoline	Swimming	Rock Climbing
6	Dodge Ball	Rock Climbing	Yoga	Dodge Ball	Tether Ball
7	Rock Climbing	Yoga	Dancing	Rock Climbing	Jump Rope
8	Swimming	Dancing	Obstacle Course	Tether Ball	Frisbee

Table 13 depicts Amy's highly preferred physical activities across five assessment periods. Four out of eight (50%) of Amy's highly preferred activities remained highly preferred across all five trials. Her highest preferred activity (average ranking of 1.8, see Appendix N) received

Figure 3. Results for Amy's PS Assessments Activity Rankings across Three Trials

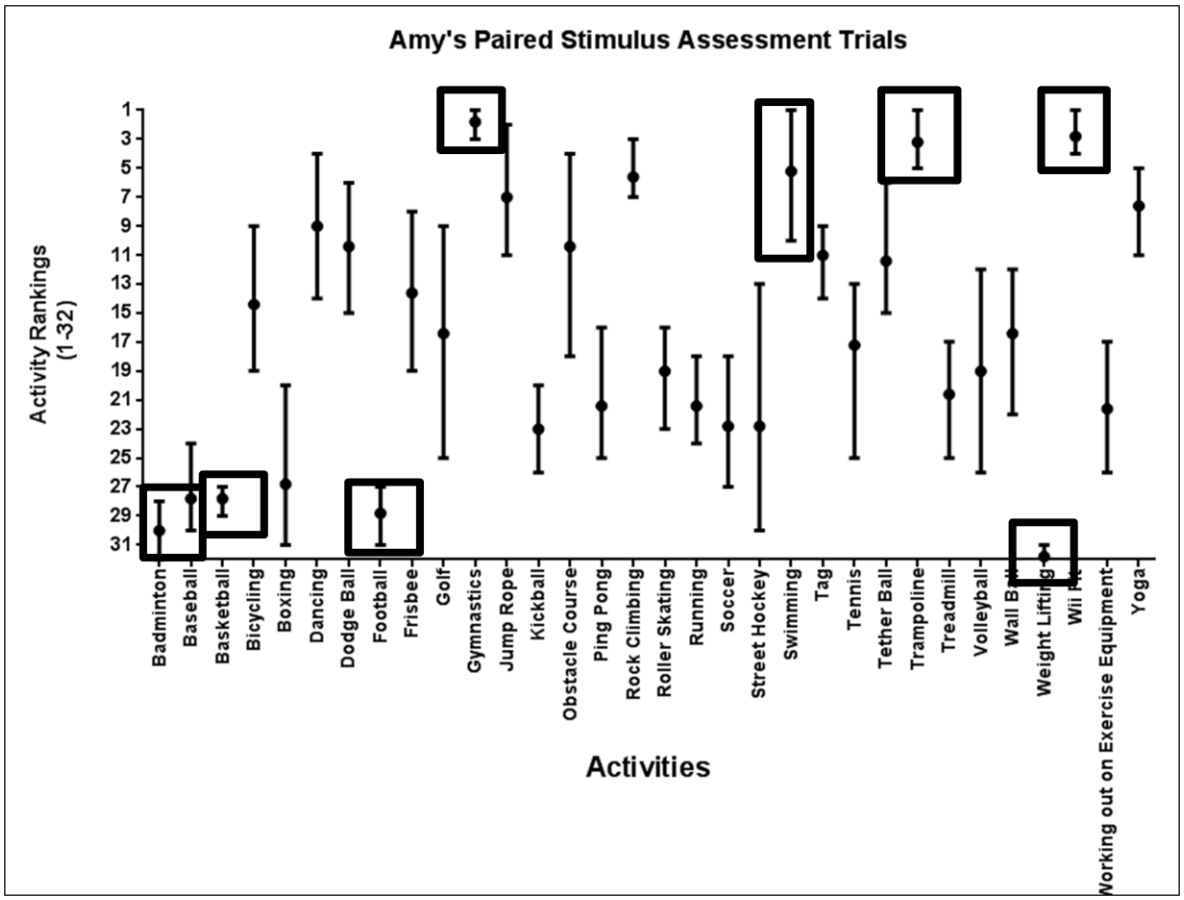


Figure 3. Graph of activity rankings for Amy across five PS assessment trials. The bars represent the variability in physical activity rankings across trials. The upper and lower points on the ends of each line represent the variance in physical activity rankings across five trials. The data points within the lines indicate average rankings. Boxes indicate Amy's highest preferred physical activities and lesser preferred physical activities.

rankings from 1 to 3 in all five assessment trials. Figure 3 displays Amy's variance in ranking for each physical activity across five PS trials. Appendix N displays Amy's actual rankings for each physical activity for every PS assessment, along with the average rank of each activity across trials.

MSWO test-retest reliability across time. Three participants completed the MSWO assessment at least twice to determine test-retest reliability over sessions and across time. Appendix O shows the rankings for all the activity items for each participant in both MSWO

assessment sessions. Amy, Devin, and Jada completed five, three, and two assessments, respectively. Table 14 shows the activities selected as the most preferred activities for the initial and last assessment completed by participants.

Table 14

Test-Retest (Across Session) Rankings for the MSWO Assessments

Rank	Amy (21 days between)		Devin (6 days between)		Jada (21 days between)	
	Initial Assessment	*Final Assessment*	*Initial Assessment*	*Final Assessment*	*Initial Assessment*	*Final Assessment*
1	Gymnastics	Gymnastics	Boxing	Boxing	Boxing	Boxing
2	Trampoline	Trampoline	Weight Lifting	Weight Lifting	Working out on EE	Football
3	Wii Fit®	Dancing	Basketball	Basketball	Yoga	Basketball
4	Jump Rope	Wii Fit®	Trampoline	Football	Tennis	Yoga
5	Frisbee	Rock Climbing	Football	Trampoline	Badminton	Volleyball
6	Dancing	Yoga	Swimming	Swimming	Trampoline	Working out on EE
7	Swimming	Obstacle Course	Roller Skating	Treadmill	Treadmill	Weight Lifting
8	Rock Climbing	Jump Rope	Dodge Ball	Working out on EE	Volleyball	Treadmill

Note. EE = Exercise Equipment

Jada's results for MSWO test-retest over sessions. Jada completed two trials of the MSWO assessment for test-retest reliability, with 21 days between both trials. The Kendall rank-order correlation for her assessments was ($r_s[30] = .442$; $p < .05$). As shown in Table 14, five out of eight (63%) of Jada's highly preferred activities remained highly preferred across both trials.

Amy's results for test-retest over sessions. As shown in Table 15, Amy completed four MSWO assessments for test-retest reliability, with statistically significant Kendall rank-order

correlations. There were 21 days between her first and fourth sessions. The Kendall rank-order correlation for both trials was ($r_s[30] = .589$; $p < .001$).

Table 15

Amy and Devin's Correlations across Multiple MSWO Assessment Sessions (N=32)

	TIME 1 to TIME 2	TIME 1 to TIME 3	TIME 1 to TIME 4	TIME 2 to TIME 3	TIME 2 to TIME 4	TIME 3 to TIME 4
Amy's R_2 Correlation	.529 *(p <.001)*	.602 *(p <.001)*	.589 *(p <.001)*	.636 *(p <.001)*	.522 *(p <.001)*	.623 *(p <.001)*
Devin's R_2 Correlation	.600 *(p <.001)*	.506 *(p =.001)*	--	.636 *(p <.001)*	--	--

Table 16 shows Amy's preferred physical activities across four sessions. Across Amy's four sessions, three out of eight (38%) of her highly preferred physical activities remained highly preferred (see Table 16). Her highest preferred physical activity remained the highest preferred across all four trials. Figure 4 displays Amy's variance in rankings for physical activities across all four trials. Appendix Q shows Amy's actual rankings of physical activity preferences for every MSWO assessment, along with the average rank of each activity.

Devin's results for MSWO test-retest over sessions. Devin completed three sessions with the MSWO assessment for test-retest reliability across time, with between zero (e.g., same day session) to six days between his first and last sessions. As shown in Table 15, Devin had a positive significant correlation at $r_s[30] = .636$; $p < .001$) between his second and third sessions, which was the highest of the three participants who completed the MSWO for test-retest reliability over sessions. Table 17 shows Devin's preferred physical activities across three sessions. Across Devin's three sessions, six out of eight (75%) highly preferred physical activities were selected in all three sessions. Appendix P provides Devin's full ranking of all the items in the array.

Table 16

Amy's Test-Retest Rankings between MSWO Assessments Completed across Multiple Sessions

Rank	Time 1	Time 2	Time 3	Time 4
1	Gymnastics	Gymnastics	Gymnastics	Gymnastics
2	Trampoline	Wii Fit®	Trampoline	Trampoline
3	Wii Fit®	Trampoline	Wii Fit®	Dancing
4	Jump Rope	Yoga	Yoga	Wii Fit®
5	Frisbee	Swimming	Rock Climbing	Rock Climbing
6	Dancing	Obstacle Course	Swimming	Yoga
7	Swimming	Bicycling	Jump Rope	Obstacle Course
8	Rock Climbing	Wall Ball	Tag	Jump Rope

Table 17

Devin's Test-Retest Rankings between MSWO Assessments Completed across Multiple Sessions

Rank	Time 1	Time 2	Time 3
1	Boxing	Boxing	Boxing
2	Weight Lifting	Weight Lifting	Weight Lifting
3	Basketball	Football	Basketball
4	Trampoline	Basketball	Football
5	Football	Trampoline	Trampoline
6	Swimming	Swimming	Swimming
7	Roller Skating	Working out on EE	Volleyball
8	Dodge Ball	Roller Skating	Working out on EE

Note. EE = Exercise Equipment

Figure 4. Results for Amy's MSWO Assessment Activity Rankings across Four Trials

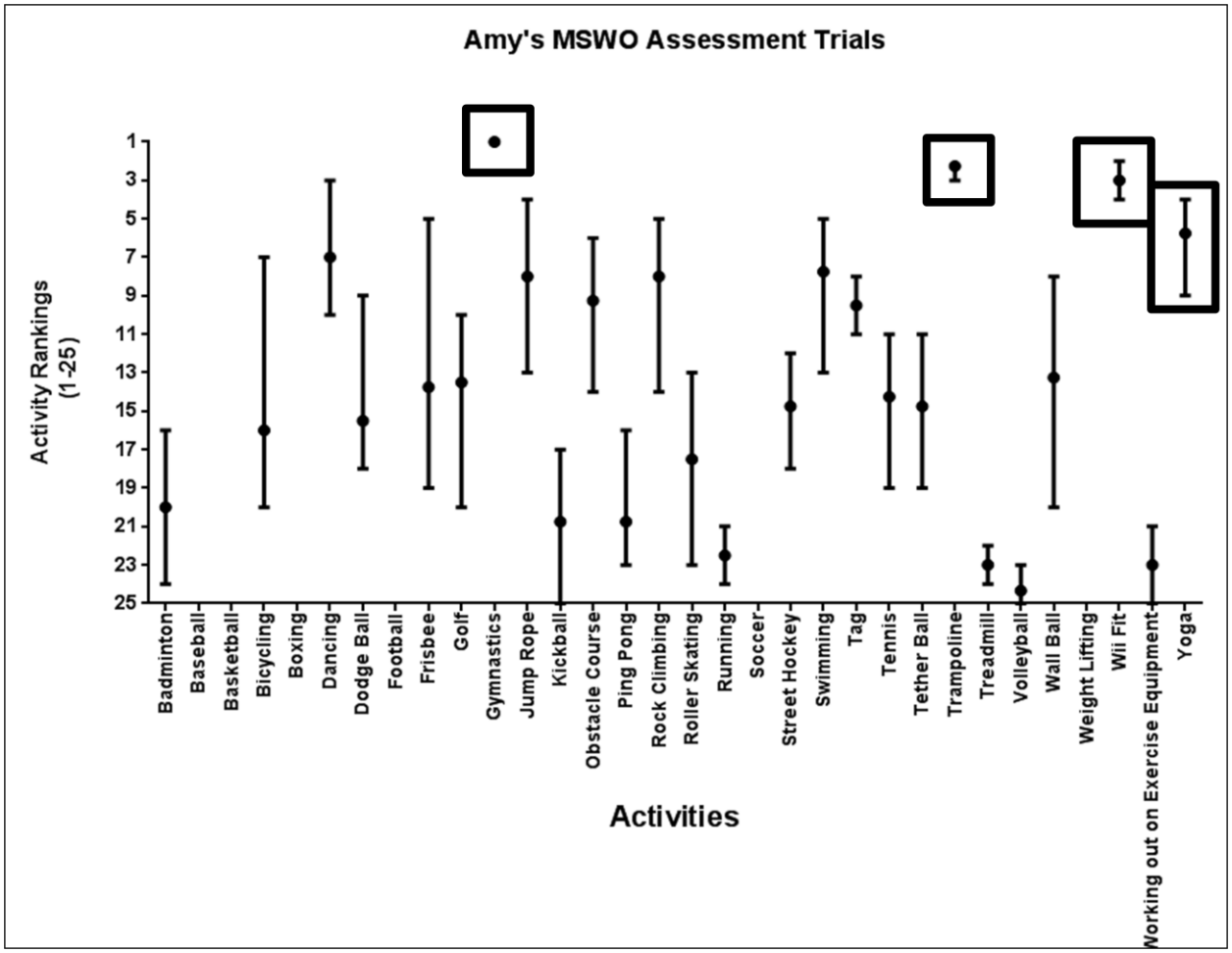


Figure 4. Graph of activity rankings for Amy across five MSWO assessment sessions. The bars represent the variability in physical activity rankings across trials. The upper and lower points on the ends of each line represent the variance in physical activity rankings across four trials. The data points within the lines indicate average rankings. Single data points not included in lines indicate activities that were given equal rankings across assessments. Boxes indicate Amy's highest preferred physical activities and lesser preferred physical activities.

Figure 5. Results for Devin's MSWO Assessments Activity Rankings across Three Trials

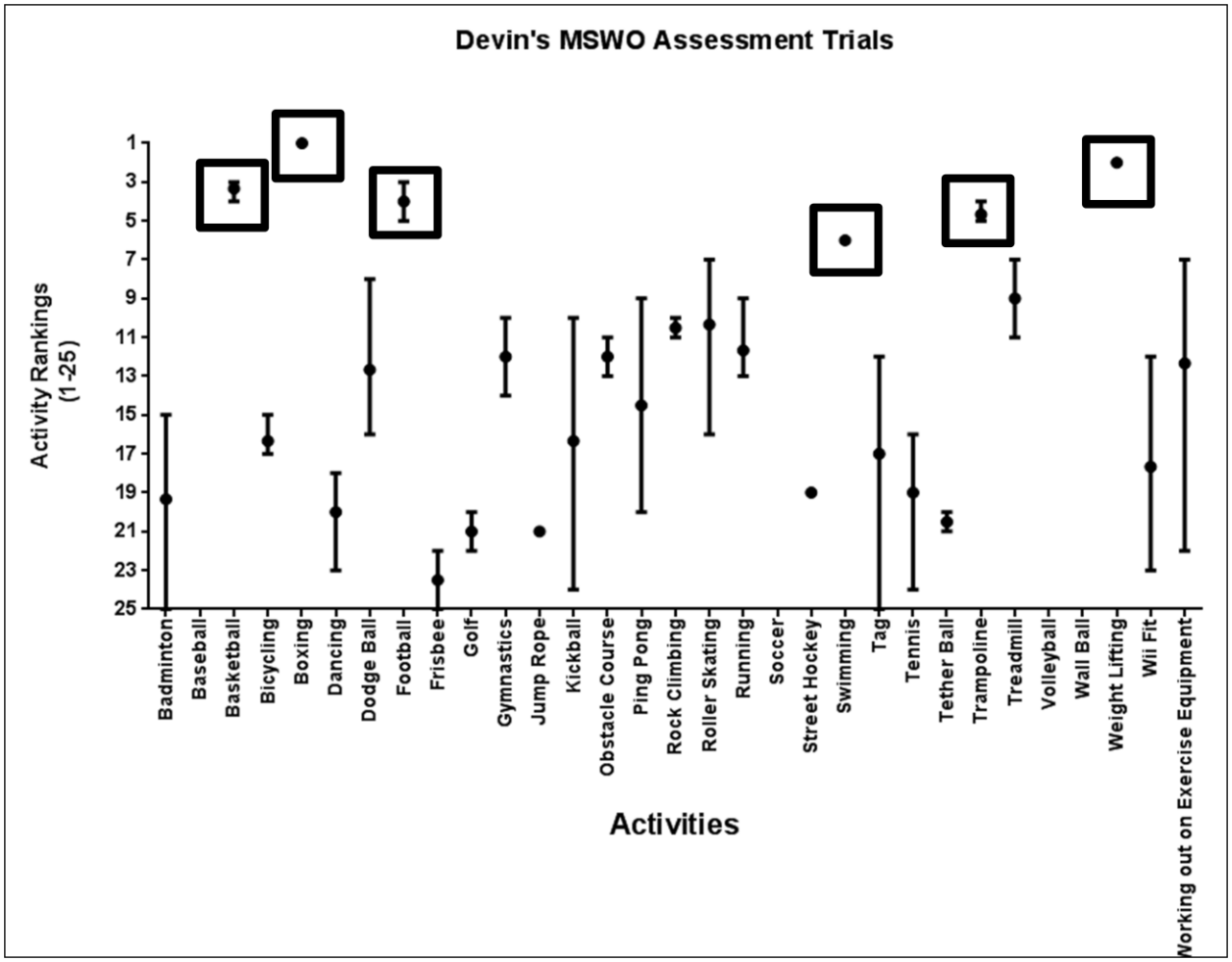


Figure 5. Graph of activity rankings for Devin across three MSWO assessment trials. The bars represent the variability in physical activity rankings across trials. The upper and lower points on the ends of each line represent the variance in physical activity rankings across four trials. The data points within the lines indicate average rankings. Single data points not included in lines indicate activities that were given equal rankings across assessments. Boxes indicate Devin's highest preferred physical activities and lesser preferred physical activities.

Categorized Paired Stimulus test-retest reliability across sessions. Five participants completed the CPS assessments for test-retest reliability across time. Devin completed two different categories within the CPS assessment. Table 18 shows the rankings for each physical activity item by participant in both CPS sessions, as well as the number of days between

sessions. Appendix R displays the actual rankings for all physical activities within the CPS assessment for all participants who completed the CPS assessment across time.

One Person activities. Two participants, Amy and Devin, completed the one person activity category to determine test-retest reliability across time. As shown in Table 9, there were 371 days between Amy's trials. There was a significant positive correlation between her assessments ($r_s[14] = .633$; $p = .001$). Three out of four (75%) of Amy's highly preferred physical activities were selected in both assessment sessions.

There were six days between Devin's sessions. The Kendall's Rank-Order between his assessments was $r_s[14].750$; p = <.001. All four (100%) of Devin's top ranked physical activities were selected as highly preferred in both of the sessions.

Table 18

Test-Retest Rankings for the One Person Activity CPS Assessments across Sessions over Time

Rank	**Amy (371 days between)**		**Devin (6 days between)**	
	Initial Assessment	***Final Assessment***	***Initial Assessment***	***Final Assessment***
1	Gymnastics	Gymnastics	Weight Lifting	Weight Lifting
2	Swimming	Trampoline	Working out on EE	Treadmill
3	Trampoline	Wii Fit	Trampoline	Trampoline
4	Wii Fit	Rock Climbing	Treadmill	Working out on EE

Two Person activities. Annette, Devin, and MaShayla completed the Two Person Activities CPS assessment (see Table 9). There were 300 days in between assessment sessions for Annette, and six days in between assessment trails for both Devin and MaShayla. The Kendall rank-order correlation for Annette's assessment sessions was $r_s[13] = .543$; $p = .005$. Depicted in Table 19, three out of four (75%) of Annette's highly preferred physical activities remained highly preferred across both sessions.

As shown in Table 9, there was a positive and significant correlation for Devin's assessment sessions ($r_s[13] = .790$; $p < .001$) and MaShayla ($r_s[13] = .700$; $p = .009$). Devin had the strongest association of the three participants who completed the two person activities CPS assessment. As shown in Table 19, all four (100%) of both Devin's and MaShayla's highly preferred physical activities remained highly preferred activities across sessions.

Table 19

Test-Retest Rankings for the Two Person Activities CPS Assessments across Sessions over Time

Rank	**Annette (300 days between)**		**Devin (6 days between)**		**MaShayla (6 days between)**	
	First Assessment	***Final Assessment***	***First Assessment***	***Final Assessment***	***First Assessment***	***Final Assessment***
1	Tag	Ping Pong	Boxing	Boxing	Basketball	Basketball
2	Dodge Ball	Tag	Football	Basketball	Soccer	Baseball
3	Street Hockey	Dodge Ball	Basketball	Football	Volleyball	Soccer
4	Badminton	Badminton	Kickball	Ping Pong	Baseball	Volleyball

Activities with a Ball. Alex and Jada completed the activities without a ball CPS assessment. There were 300 days between assessment sessions for both participants. As shown in Table 9 (and Table 19 for specific physical activity selection), there was a positive correlation between the selected activities across sessions for both Alex ($r_s[11] = .487$; $p = .020$) and Jada ($r_s[11] = .641$; $p = .002$). Three out of five (60%) of Alex' highly preferred physical activities were selected across both sessions. Four out of five (80%) of Jada's highly preferred items were selected in both sessions (see Table 20).

Reliability Across Assessment Methodologies

To determine reliability of preference selection across assessments, five participants completed both the MSWO and PS preference assessment methodologies during the same session (see Table 21).

Table 20

Test-Retest Rankings for the Activities with a Ball Category in the CPS Assessments across Sessions over Time

Rank	**Alex (Activities with a Ball)**		**Jada (Activities with a Ball)**	
	First Assessment	*Final Assessment*	*First Assessment*	*Final Assessment*
1	Volleyball	Volleyball	Volleyball	Volleyball
2	Basketball	Basketball	Basketball	Football
3	Kickball	Soccer	Tennis	Basketball
4	Football	Baseball	Football	Tennis

Table 21

Kendall Rank-Order Correlations across PS and MSWO Methodologies

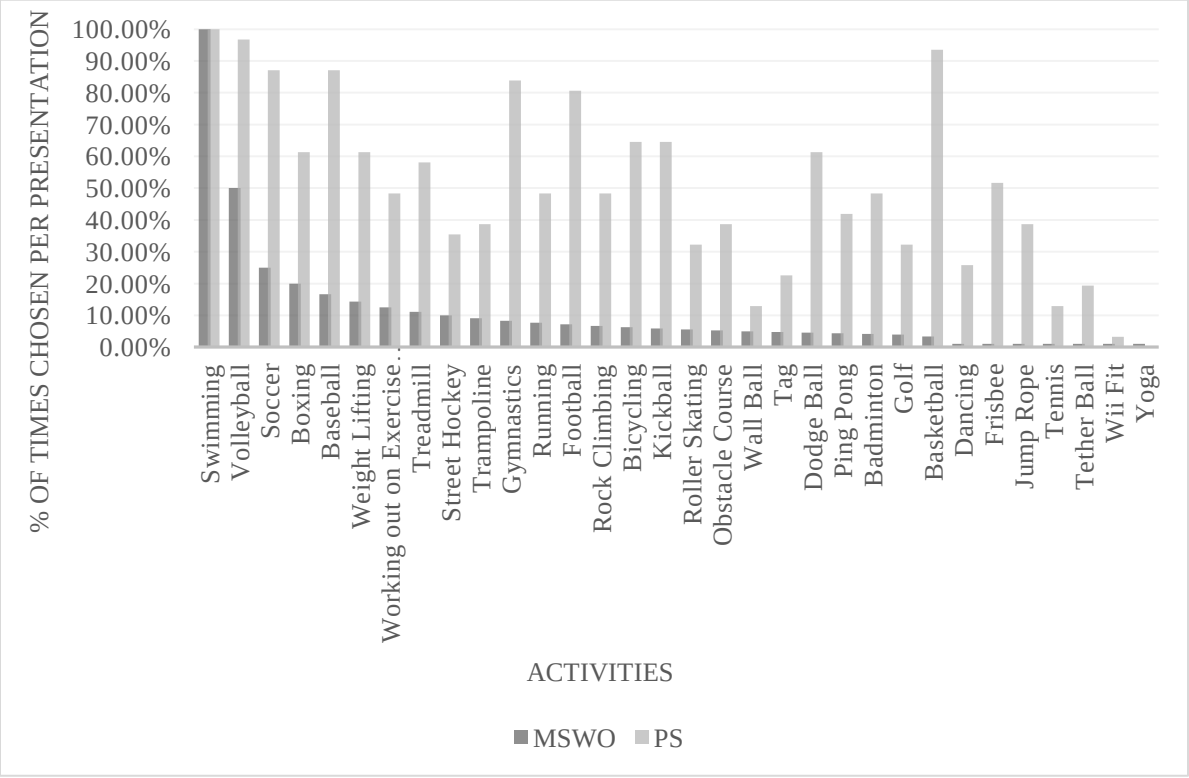
	Alex	**Amy**	**Devin**	**Jada**	**MaShayla**
	.513	.547	.640	.713	.640
τ			*.740*		

Note. τ Kendall's Rank-Order Correlation Coefficient; All correlations are significant at the p < .001 level.

Table 21 displays all the participants' Kendall's Rank-Order correlations across the PS and MSWO assessment methodologies. Figures 6 through 11 display each participants preferred physical activities as the percentage of times the activity was chosen when presented (e.g., available to be selected).

Alex. The PS and MSWO assessments showed a statistically significant Kendall rank-order correlation of ($r_s[30] = .513$; $p < .001$). Across both the MSWO and PS methodologies, Alex's top two preferred physical activities (swimming and volleyball) were identified consecutively. Soccer and baseball were ranked as highly preferred in both assessment methodologies. Altogether, 63% of Alex's highly preferred activities in the MSWO assessment were also highly preferred in the PS assessment.

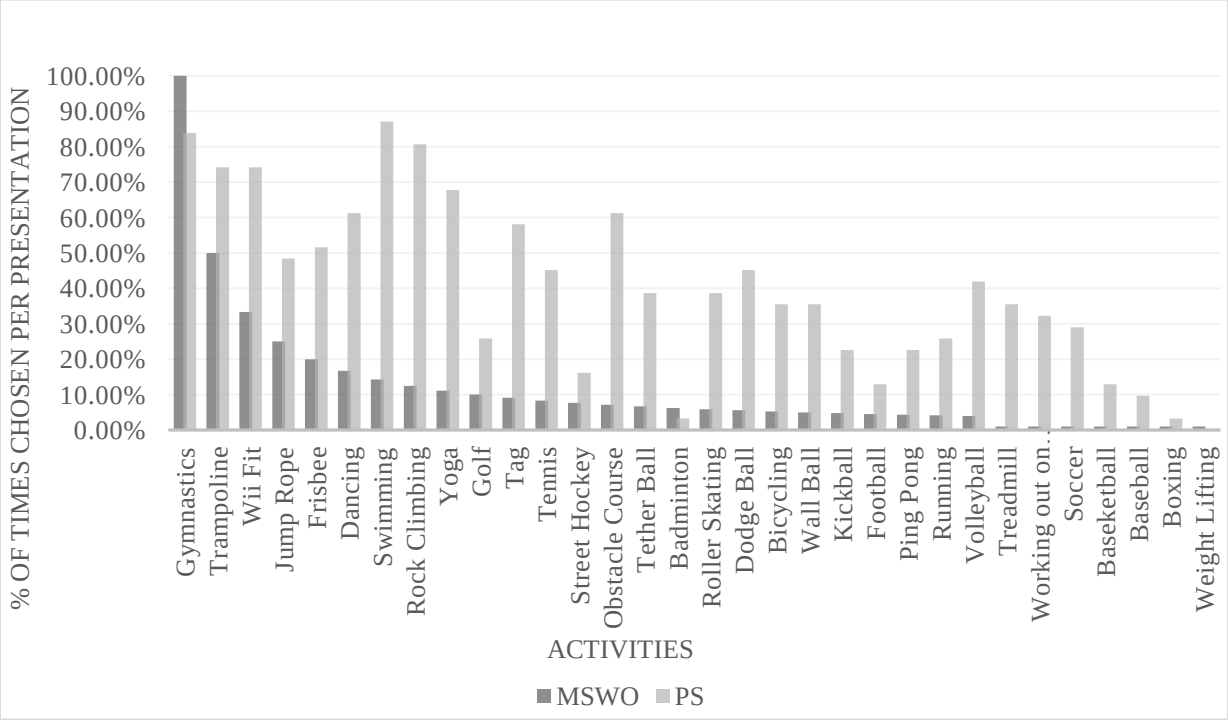
Figure 6. Alex's MSWO and PS Results



Amy. The Kendall rank-order correlation between the MSWO and PS assessments was statistically significant ($r_s[30] = 547$; $p < .001$). Both assessments identified gymnastics as highly preferred, while receiving ranks 1 and 2 respectively. Figure 7 displays that 75% of highly preferred activities (top eight) remained highly preferred across both methods.

Devin. Devin completed the MSWO and PS assessment trials in two sessions to determine concurrent validity. Across both sessions, boxing was ranked as the highest preferred physical activity, while weightlifting and basketball were consecutively second and third preferred across both MSWO and PS methodologies (see Figures 8 and 9). Sixty-three

Figure 7. Amy's MSWO and PS Results

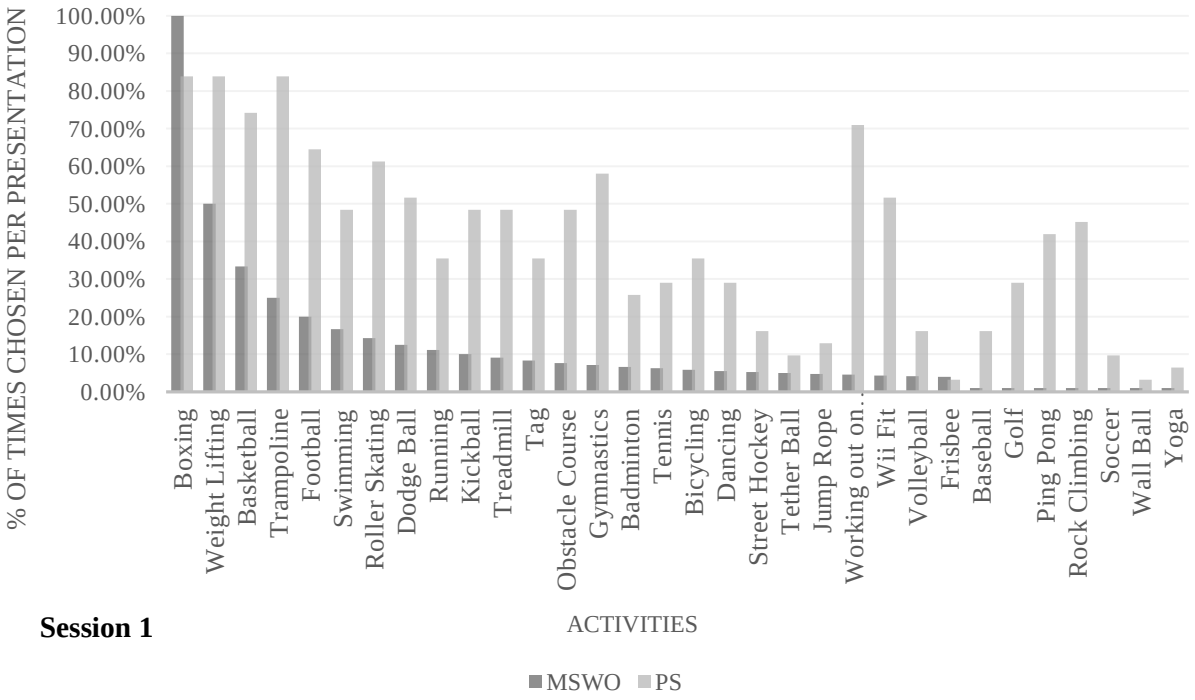


percent of Devin's highly preferred physical activities were preferred across both methodologies (Session 1). His second session resulted in 100% of highly preferred activities remaining highly preferred across methodologies. There was positive significant correlation for Devin's MSWO and PS assessment in Session one ($r_s[30] = .640$; $p < .001$) and in Session two ($r_s[30] = .740$; $p < .001$).

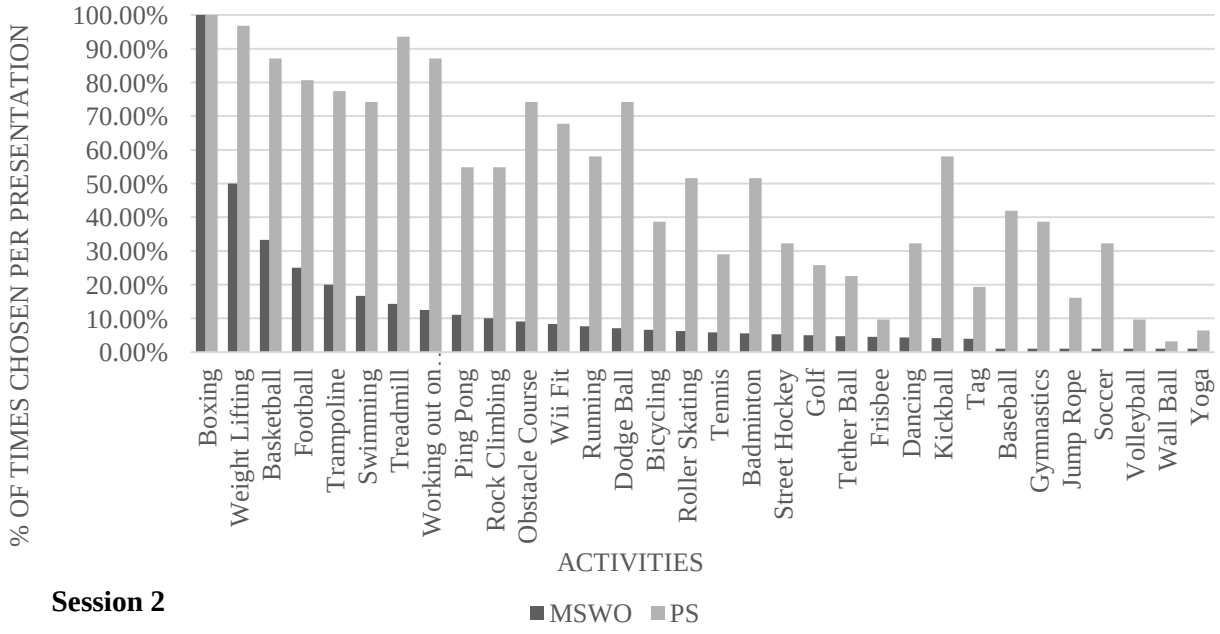
Jada. Jada's Kendall rank-order correlation across the MSWO and PS assessments was ($r_s[30] = .713$; $p < .001$). Across both MSWO and PS trials, boxing was chosen 100% per

presentation. Of her highly preferred activities (top eight) identified in the MSWO assessment, 88% (7 out of 8) remained highly preferred in the PS trial (see Figure 10).

Figures 8 and 9. Devin's MSWO and PS Results (Session 1 and Session 2)

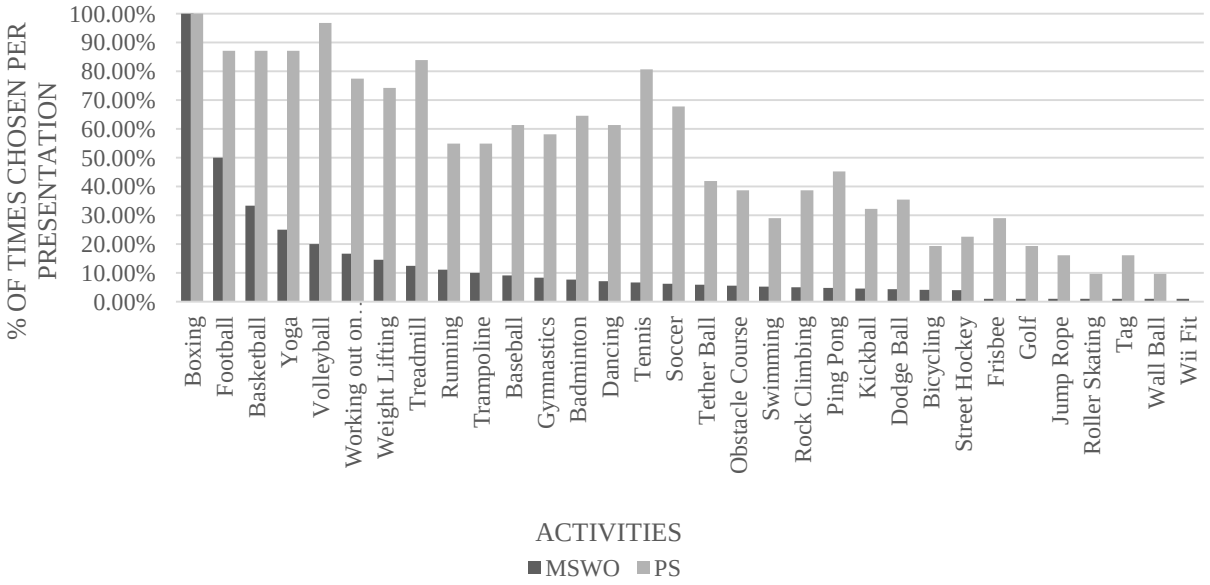


Session 1



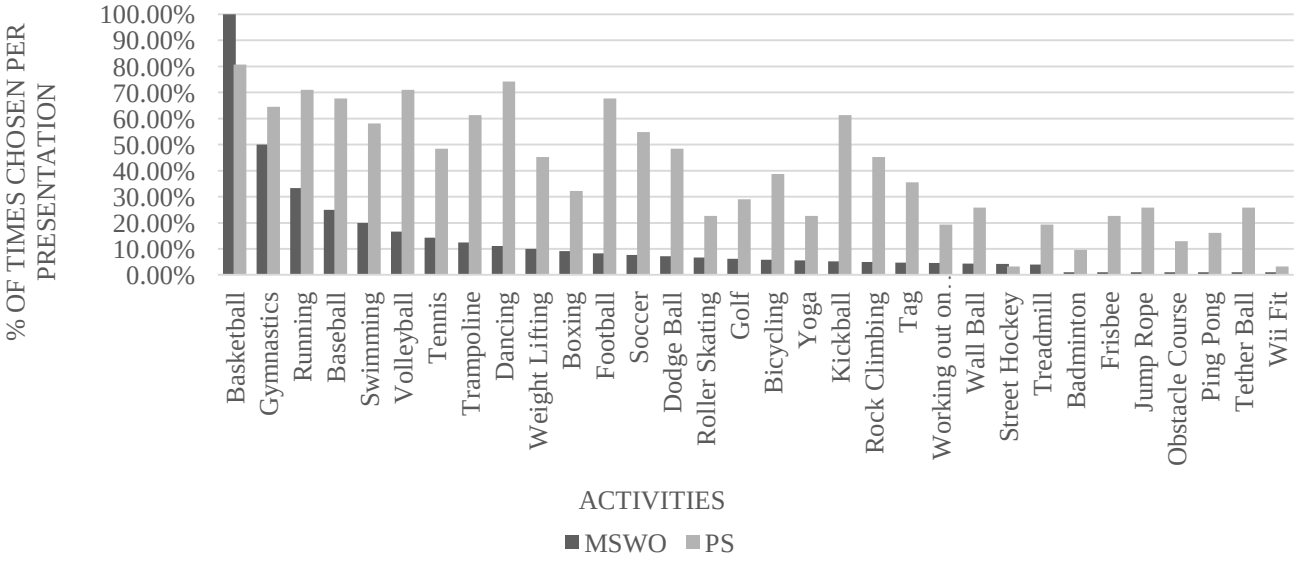
Session 2

Figure 10. Jada's MSWO and PS Results



MaShayla. The Kendall's Rank-Order correlation for MaShayla's MSWO to PS sessions was ($r_s[30] = .640$; $p < .001$). Across both methodologies, basketball was ranked the highest preferred physical activity. Out of her eight highly preferred activities identified in the MSWO assessment, 75% (6 out of 8) remained highly preferred in the PS assessment (see Figure 11)

Figure 11. MaShayla's MSWO and PS Results



Discussion

The purpose of this study was to examine the reliability and validity of the A-PLAY, a web-based preference assessment application, to identify youths' physical activities preferences. The results suggest that the application can effectively identify youths' preferred physical activities. Through the implementation of this study, researchers sought to answer the following questions:

(1) What were the highly preferred physical activities identified by youth in each neighborhood site?

(2) Did youth participants reliably select types of physical activities using the A-PLAY?

(3) Is the selection of highly preferred types of physical activities by youth participants similar across preference assessment methodologies?

What were the highly preferred physical activities identified by youth in each neighborhood site?

Youth residing in Edgewood Homes identified swimming, boxing, basketball, gymnastics, trampoline, rock climbing, dancing, and soccer as their highly preferred physical activities. Prior to researchers implementing the A-PLAY at Edgewood Homes, the Physical Activity Resource Assessment (PARA) (Lee, Booth, Reese-Smith, Regan, & Howard, 2005) was implemented to determine what physical activity resources (e.g., basketball courts, rock climbing wall) may be available for residing youth. The PARA showed that basketball, rock climbing, soccer, and an open area within the community center (which could be used for dancing) were available physical activity resources, which could explain why these activities were highly preferred by youth.

Swimming, boxing, gymnastics, and trampoline were not activities that could easily be implemented at Edgewood Homes. However, Chris Lempa, Youth Program Director (personal communication, Spring, 2013) indicated that youth are provided with opportunities to attend a local community center (which has a gymnastics room on site, including gymnastics equipment such as trampolines) and/or a pool that is available to the public. The ZOMBIE program at Edgewood Homes provides transportation to these sites, at no charge to youth or their families.

Boxing was not indicated as being an option for youth to participate in within the ZOMBIE program. However, Haskell Boxing Club (Haskell Indian Nations University) is located approximately one and one-half miles south of Edgewood Homes. Therefore, Haskell Boxing Club can be accessed via walking, bike riding/skating, and is on the Lawrence Transit bus route to and from Edgewood Homes. In a personal communication with a participant of Haskell Boxing Club (Spring, 2013), it was mentioned that monthly fees to participate in the boxing program do not exceed $25.00 per month. With the boxing program having fairly easy accessibility may explain the ranking of this physical activity being highly preferred to youth at Edgewood Homes.

Youth residing in the Foxmoor neighborhood indicated that gymnastics, swimming, trampoline, boxing, basketball, weight lifting, Wii Fit®, and dancing were their highly preferred physical activities. However, the Neighborhood Association leader at Foxmoor indicated that tennis and tetherball are made available on a monthly basis (personal communication, Summer 2014). Within the neighborhood, there are open spaces to play basketball, kickball, and soccer. Therefore, there does not seem to be a strong relationship between activities that youth engaged in and preference of physical activities, with the exception of basketball and possible dancing, which can be done in open spaces. Further, the limited activities that are currently at Foxmoor

may suggest providing opportunities for youth to engage in activities outside of the neighborhood (e.g., boxing, gymnastics, weight lifting, etc.), which could possibly be used as incentives for participation in the neighborhood association activities (e.g., clean-ups).

Did youth participants reliably select preferred types of physical activities using the A-PLAY?

Participants in Edgewood Homes and the Foxmoor neighborhood completed multiple trials of the same assessment methodology. This was done in order to determine whether or not youth selected preferred physical activities reliably. Analyses were completed with the test-retest results within one methodology completed in a single session and multiple assessment sessions conducted over time (e.g., more than two session). Overall, participants reliably selected their preferred types of physical activities based on both the test-retest reliability within one session, as well as across multiple sessions.

Test-retest reliability within single session. The majority of highly preferred physical activities were selected in both the test-retest assessment trials. Eighty nine percent of the most preferred physical activities (ranked in the top quartile) across all assessments remained the highest ranked activities across trials of the same assessment. Although nearly all of the correlations were significant, the lowest correlation, based on an average of all correlations within one assessment methodology, was within the MSWO assessment. The highest correlation was within the PS assessment, however only one participant (Amy) completed the PS twice in one session. Similarly, the assessment that youth consistently chose highly preferred physical activities (e.g., the top $1/4^{th}$ of array) was PS. However, the CPS assessments resulted in the second highest assessment that youth consistently chose highly preferred physical activities (71% average of highly preferred activities chosen across methods), not MSWO. However, the

CPS assessments had a larger number of completed trials (n = 6). There were stronger correlations associated with the CPS, which suggest that the categories within this assessment may be an additional preference of youth (e.g., preference for activities with a ball than activities without a ball). Participants completing MSWO trials (n = 3) averaged 63% of consecutive highly preferred physical activities selected across trials. Therefore, ensuring that participants complete all assessments may provide additional information on correlation reliability and consistency in selecting highly preferred physical activities.

Nearly, all of the study participants had positive significant correlations across assessment trials within the same session. Of the nine participants, only one participant (Mikka) received a Kendall rank order correlation that was not statistically significant across MSWO sessions. However, her top ranked physical activity (swimming) remained the highest ranked across trials. Her second and third preferred physical activities (gymnastics and trampoline) were still ranked second or third across trials. This may suggest that the participant may have identified the most highly preferred activities, while not possibly having a strong preference for other activities.

A related aspect may be within the data obtained from the Physical Activity Survey, which asks youth what physical activities they have engaged in seven days prior to completing preference assessment methodologies. This data may show a relationship between highly preferred activities chosen, and not necessarily correlation between test-retest (e.g., Mikka's MSWO correlational results versus highly preferred activities) and activities engaged in the previous seven days. However, Mikka's Activity Participation Survey indicated that football was the only activity she engaged in previous seven days prior to completing the MSWO.

Amy's Activity Participation Survey indicated that she engaged in dancing, gymnastics, football, and jump rope. In her PS assessment, taken during the same session, indicated that trampoline, gymnastics, Wii Fit®, obstacle course, swimming, dodge ball, rock climbing, and tether ball are her highest preferred physical activities. Here, there is a slight relationship with gymnastics being one of her preferred activities and participating in gymnastics seven days prior to taking the assessment.

Devin showed a stronger relationship between his Activity Participation Survey and his actual assessment (MSWO). His Activity Participation Survey indicated that he engaged in baseball, basketball, boxing, dancing, dodge ball, jump rope, running, weight lifting, and Wii Fit®. Similarly, his highly preferred physical activities included boxing, weight lifting, basketball, dodge ball, and running. This shows a 56% agreement between preferred physical activities and activity participation.

MaShayla showed a slightly higher relationship between activities participated in seven days prior to completing the MSWO assessment and her highly preferred activities. Her Activity Participation Survey indicated that she engaged in baseball, basketball, dancing, gymnastics, kickball, running, soccer, tag, trampoline, and volleyball. Her highly preferred physical activities included basketball, volleyball, gymnastics, running, baseball, and trampoline. This shows a 60% agreement between highly preferred physical activities and activity participation. Examining the preference assessment results within the context of the activity participation assessment may suggest that youth engage in the physical activities that they enjoy the most, assuming these activities are available. However, it could also be assumed that experiencing the activities first (prior to completing the assessment) resulted in higher rankings.

Test-retest reliability across multiple sessions. The test-retest reliability across time assessments showed that youth's preferences remained relatively consistent over time. The selection of items that were highly preferred did not vary much based on the length of time between assessment sessions, which spanned from multiple sessions conducted within a week to a year. The preferences of these youth did not significantly change over time, and the most preferred physical activities remained relatively consistent across time.

There is another key consideration regarding the selections by youth with longer durations in between sessions. Four participants Alex, Amy, Annette, and Jada completed a total of six assessments with at least 300 days in between each session. Alex and Amy completed the PS assessment, with 321 and 393 days in between assessments, respectively. Compared to MaShayla, who had only a six day lapse in between her PS assessments and selected her highest ranked activity consecutively, both Alex and Amy also selected their highest preferred activity consecutively across approximately one year. This is important for demonstrating not only consistency in highest preferred physical activities over time, but also with the ability to select reliably within a large array of items (32) in a PS assessment.

Alex, Amy, Annette, and Jada completed the CPS assessment with at least 300 days in between trials. Annette was the only participant out of the four mentioned here that did not consistently select her highest preferred physical activity across both trials. However, her variance in ranking was within one placement (e.g., her top ranked activity was ranked second in the next trial). Alex, Amy, and Jada, in comparison with Devin and MaShayla (six days in between their assessments) all ranked their highest preferred activity consecutively across both trials. Further, Alex ranked her second highest preferred activity consecutively across both trials. These findings may suggest that time may not be a factor in reliably selecting highly preferred

physical activities. Another conclusion could be the age of the participants, as the older youth may be better able to complete the assessments, or may gain familiarity with the assessment instrument if completing multiple assessments within close time. However, Amy was age ten at the time of assessments. Alex was age 12 and Jada was age 14. Alex, though, had a more accurate ranking of highest preferred activities (top two preferences) across 300 days than Jada.

Amy specifically completed the PS assessment five times. Although her correlations were positively statistically significant across all trials, the significance began to decrease across time. Devin, however, completed the MSWO three times. All of his trials were positively statistically significant also. Across his trials, his significance did not decrease. His final trial's correlation resulted in being a stronger correlation than his first trial. This could be due to Devin's assessments (MSWO) were shorter assessments, and he completed only three. Amy, though, was completing the longer PS assessments, and did so five times.

Amy's highest preferred physical activities across her PS trials included gymnastics, rock climbing, trampoline, and Wii Fit®. However, no activities were chosen consecutively as the top ranked activity across her five trials, but were all indicated to be highly preferred activities. The number of days across all five of her sessions was 393. Devin's top ranked physical activity, boxing, was top ranked for 100% (all four) MSWO trials, which spanned six days. Weightlifting was ranked second across all four sessions. Seventy-five percent of his highly preferred physical activities were ranked within the top eight across all four trials. These data could entail that, for Amy, preference ranks may alter slightly over time. However, her top ranked activities still remained highly preferred with variance in highly preferred rankings (e.g., top eight). Based on Layer, Hanley, Teal, and Tiger (2008), slight preference shifts

Fifty percent of Amy's highly preferred activities were categorized as highly preferred across all five of her PS trials and all four of her MSWO trials. Gymnastics received the top rank across all four MSWO trials. However, Amy's span of days across her first and last assessment is unknown due to a system error. These results indicate that across multiple trials, which took place within same sessions and across time, participants continued to select their preferred physical activities consistently.

Is the selection of highly preferred types of physical activities by youth participants similar across preference assessment methodologies?

Youths' selection of physical activity preferences was similar across the MSWO and PS assessment methodologies. The correlations for all five youth who completed the PS and MSWO assessment were positive and significant. Alex's highest preferred activity, swimming, was ranked the highest in both methodologies. For Devin (Sessions 1 and 2), Jada, MaShayla, and Alex, the highest preferred activities were consistently ranked across their MSWO and PS trials.

Amy's two highest ranked activities were selected across both assessment methods, but were inverse. Furthermore, the highly preferred activities (i.e., top eight ranked activities) were selected in both the MSWO and PS methods for most participants. Specifically, Devin's preferred physical activities (Session 2) identified in the MSWO and PS assessments were identical.

Overall, youth were able to reliably identify preferred physical activities across same-session trials and across time trials. Youth were also able to identify preferred physical activities similarly across preference assessment methodologies. Further, youth regularly identified their most preferred physical activities across trials of the same method, multiple sessions over time, and also across different methodologies. The findings from the present study indicate that the A-

PLAY application is a valid tool that can reliably be used to determine youths' preferred physical activities. Both the PS and MSWO recognize highest preferred activities (i.e., ranked one) consistently. Although other activities that are highly preferred (e.g., the remaining seven activities) may not have the identical rank, the activities were still generally considered to be high preferences (e.g., selected within the top 25% of the array).

Strengths and Limitations

Study strengths. There were some strengths of the present study, which minimized threats to internal and external validity. One strength includes the integration of computer-based technology to support the implementation of preference assessments methods. The A-PLAY application utilizes easily-administered computer technology, which reduces the need for trained research personnel. It immediately produces automated results, which can provide more immediate information and feedback to the end user (e.g., youth, parent, and program staff). Further, there is no need to obtain inter-observer agreement (IOA) since the identification of preferred physical activities is an automated process as a part of the application. The researchers did periodically test the application to ensure the application's automated computation of activity rankings were calibrated with the researchers' manual calculations. Because of A-PLAY's ease of implementation and its convenience of being a web-based tool, materials needed for the study (e.g., computers with internet access) were available at each setting.

Additional strengths of the current study include the implementation of multiple assessments within same trials, across time, and across methods to determine test-retest reliability and to examine consistencies in preference selections by youth. Threats to internal validity were minimized (e.g., history and maturation) by ensuring participants completed at least two trials of assessment methodologies within the same session. To answer one of the

study's research questions, it was important to administer assessment methods both within and across sessions (over time) to ensure reliable results. Further, the use of computer technology minimized threats related to instrumentation. Also, threats to both internal validity and external validity were minimized by including multiple youth participants from the priority population (e.g., low income, minority youth) of the study who were of varying ages, gender, and race/ethnicity, along with the inclusion of youth from different sites.

Study limitations. The current study had some limitations. The major limitation was not implementing a reinforcer assessment, which would have further validated whether or not items identified as highly preferred would actually serve as reinforcers. Also, the selection of the participants was based from a convenience sample, even though the participants were representative of the priority population (i.e., low-income, minority youth). Therefore, a randomization of study participants would be beneficial for future studies. Additionally, one potential threat to internal validity included maturation of some participants completing the assessment methods. Participant drop out occurred (e.g., family relocating) within the Edgewood Housing site, which affected researchers' ability to obtain additional data across sessions/time. Further, once participants understood the assessment application, it could have caused slight reactivity (e.g., completions of assessments to receive an incentive versus ensuring responses were accurate). The activities identified in the activity participation survey were not validated such as by parents.

Additionally, researchers found that it took the older youth overall less time to complete all of the preference assessments. However, the older youth did not necessarily have stronger correlations. Lastly, all data from the Activity Participation Survey was not available during

earlier assessments conducted between June 2013 and February 2014 due to technological errors, which were resolved by later assessment periods.

Current and Future Implications of the Present Study

Current Study. The present study suggests that the A-PLAY is a reliable and practical tool that expands the practice of preference assessment administration towards a more modern technological-based platform. The application can reliably predict highly preferred physical activities, even with slight shifts in the rank order of preferred activities (e.g., placement or rank of activity may have shifted one to two ranks between administration) (Hanley, 2008). The application may be beneficial in reducing the time and cost of administering preference assessment implementation. Furthermore, the application allows for easier collection of group preferences, as it allows preference assessments to be administered to multiple individuals simultaneously and/or on a more ongoing bases.

More so, the A-PLAY supports the notion of increasing youth engagement in youth programming by providing them with opportunities to identify preferred activities to include in youth-related programs. The physical activity preferences of youth participants in the current study will be used to help youth programming at both Edgewood Homes and the Foxmoor Neighborhood. The A-PLAY also may assist programs with limited resources in strategically investing in the types of activities identified to be more highly preferred by youth participants of the program. The assessment can be administered successfully to older (i.e., elementary, middle school, high school age), typically developing youth in naturalistic contexts, such as in the youths' homes, community centers, and youth-sponsored organizations (e.g., Boys and Girls Club) to identify individual and/or group preferences.

Future Research. With further development and testing, the A-PLAY will be able to extend beyond obtaining physical activity preferences to identify other types of healthy behaviors (e.g., fruit and vegetable preferences, reading/book preferences). The application will have the functionality to modify the items in the assessment to conduct preference assessments with different categories of arrays. Therefore, programs geared to manipulate various target behaviors will benefit from the application's flexibility and functionality to determine various types of preferences efficiently. This flexibility and efficiency is due to the utilization of technology to determine preferences. Although later adaptations to the A-PLAY will allow for arrays included in the tool to be tailored to specific behavior programs, its current functionality is to identify preferred types of physical activities for youth. The integration of technology may expand the utility and adoption of preference assessment methodology across various disciplines and fields (e.g., community psychology, prevention science, youth development, health promotion, etc.). A future goal includes examining the reinforcer assessment, which will further validate if items identified as highly preferred will actually serve as reinforcers.

Conclusion

The A-PLAY was designed to determine the physical activity preferences of youth based on traditional preference assessment methodology used in Applied Behavior Analysis. The identification of youths' preferred physical activities may help youth-based community programs increase and/or maintain youth engagement, while also increasing physical activity participation. One goal of Healthy People, 2020 is to increase youths' engagement in physical activity for at least 60 minutes per day. Engaging youth in physical activities for 60 minutes per day leads to healthier outcomes and fewer occurrences of youth chronic diseases as physical inactivity is a modifiable health risk behavior (US Department of Health and Human Services, 2012).

For lower income, urban, and/or minority youth, engagement in physical activities can be challenging (Bash, 2011; Wilson et al., 2005). Although the overall engagement of youth in physical activities have decreased, youth residing in lower income communities are more likely to have additional barriers to accessing physical activity resources (e.g., monetary constraints, sustainability of physical activity programs, diversity of physical activity opportunities). Additionally, youth in lower income neighborhoods may begin to engage in unhealthy or destructive activities when healthier, more constructive pro-social activities are not available (Sanderson & Richards, 2010). Research has noted that to increase youth participant in physical activity programs in lower income and urban minority communities, youths' selection of their preferred physical activities should be a part of intervention programming (Wilson et al., 2005).

By being aware of activity preferences, youth-centered programs may be able to include preferred physical activities to increase youths' engagement. Youth participation in regular physical activity decreases the probabilities of youth for chronic diseases, such as hypertension and type 2 diabetes (US Department of Health and Human Services, 2012). This is crucial in low-income and urban minority neighborhoods, where youth tend to be less physically active than youth living in higher socioeconomic areas (Wilson et al., 2005). Although there are many contributing factors related to youth physical inactivity, one piece of the puzzle may be related to providing increased opportunities for youth to both choose and engage in preferred types of physical activities in community settings. It is particularly important during adolescence, when youth begin to make their own decisions regarding sustainable health behaviors, to promote and provide opportunities for youth to engage in preferred types of physical activities within their immediate environment.

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Appendix A

Parent-Guardian Informed Consent Statement. Page 5 of original consent for intentionally left blank.

PARENT-GUARDIAN INFORMED CONSENT STATEMENT

Increasing Youth Participation in Leisure-Time Physical Activity by Assessing Youth Preferences and Environmental Determinants

INTRODUCTION

As a participant of this project, you and your child will help us better understand how to engage youth in physical activities that are reinforcing during out-of-school time.

The University of Kansas (Department of Applied Behavioral Science) supports the practice of protection for human subjects participating in research projects. The following information is provided for you to decide whether you wish for your child to participate in the present study. You may refuse to sign this form and not allow your child to participate in this study. You should be aware that even if you agree to allow your child to participate, you are free to withdraw at any time. If you do withdraw your child from this study, it will not affect your relationship with this unit, the services it may provide to you, or the University of Kansas.

PURPOSE OF THE STUDY

The purpose of the project is to identify the types of physical activity youth, ages 7 to 18 years, prefer to be engaged in during their leisure time (i.e., non-school hours). The two components of the project includes: (a) Assessment of Preferred Leisure Alterneratives for Youth (A-PLAY) and (b) the Preferred Leisures Alternatives for Youth (PLAY) program. The assessment results will be used by the community organization to better identify types of activities to provide for youth in the community. Your child may participate in only the assessment or in both the assesment and PLAY program.

The Assessment of Preferred Leisure Alternatives for Youth (A-PLAY) will assess the types and availability of physical activities that youth like to participate. The Preferred Leisure Alternatives for Youth (PLAY) intervention is a 10-week program that will provide semi-structured opportunities for youth to participate in preferred types of physical activities they find rewarding.

PROCEDURES

Youth, between the ages of 7 to 18 years, who agree (based on parental consent) to be involved in this project will be invited to participate in both components of the project including the assessment (A-PLAY) and 10-week PLAY program. The project is being supported by a partnership between researchers at the University of Kansas (KU) and local community organizations and agencies.

Assessment of Preferred Leisure Alternatives for Youth

If you consent to the participation of your child in the assessment component of this project, two surveys will be administered to your child during an assessment session. It is estimated that the total time your child may be involved in an assessment session is for 1 hour and 15 minutes. The surveys will be administered by the researchers at the community organization site using a web-based application.

The first survey is the Assessment of Preferred Leisure Alternatives for Youth (A-PLAY), which may take approximately one hour to complete. The A-PLAY includes several computer-based assessment methods that presents either pictures or video clips of 31 different types of physical activities. Each type of physical activity is presented (i.e., paired) with all other types to help identify your child's more preferred types of activities.

The other survey is the Youth Leisure-Time Activity Survey, which includes 87-items to assess the frequency of your child's current level of participation in leisure-time activities, including physical activity and other appropriate (e.g., watch T.V.) and inappropriate (e.g., use drugs) behaviors youth may engage in during leisure time. There are some items of the survey that ask your child about involvement in inappropriate activities such as skipping school, fighting, or using drugs. We understand that these questions may be uncomfortable for your child to answer. Please know that any information your child provides regarding these sensitive questions are only to help us understand what kids do in their spare time, and will only be reported aggregately and anonymously (deidentifed) for all the youth in the program. The Youth Leisure-Time Activity Survey may take your child approximately 15 minutes to complete.

Participation in the Preferred Leisure Alternative for Youth Intervention

If you consent to the participation of your child in the 10-week PLAY program, the researchers will request that your child complete two assessment sessions prior to beginning the 10-week program. Your child will receive a $5 gift card, which will be provided to the guardian, upon completion of the initial assessment session and enrollment in the PLAY program. The assessment may be given to your child twice before the program begins (to ensure consistency in responses), and then once after the program ends.

As part of the leisure-time physical activity program, your child will be able to participate in preferred types of physical activities, which will be accessible through the community partner sites for 10 weeks between 4:00 and 8:00 pm. Participation and the frequency of attendance at program sessions are voluntary for your child. After each program session, the researcher will collect basic information regarding your child's participation in the program such as attendance, types of preferred activities selected, and basic demographic data (i.e., age, race, gender). Weekly, your child will complete a web-based log of the types of physical activities that engaged in that week.

Your child may be requested to wear an accelerometer. An accelerometer is a small device that your child will wears on his or her waist or wrist that measures his or her level of physical activity. The researchers will also provide instructions on how and when the device should be worn. At the end of the 10-week program your child will receive 30 cents for each day the accelerometer was worn (including during 4-weeks of baseline prior to the program starting), for a maximum of no more than $25.

RISKS

There are no known risks associated with participation in this study. However, this study may involve your child participating in daily physical activity. By signing this consent form, you are verifying that the health condition of your child will permit their participation in this type of physical activity, in a self-paced fashion. You are also agreeing that you will not hold the University of Kansas or any of its faculty, staff, or students liable for any injury, accident, or health emergency that results from your participation in this study.

If your child is physically injured during program activities, parents/guardians will be immediately notified by the representatives from the community partner organization through phone or in-person communication. If your child experiences a major injury or emergency, representatives from the community partner organization or program will immediately notify the parents/guardians and also call for emergency medical response (i.e., 911). The community partner organization will maintain records with emergency medical and contact information.

BENEFITS

There are many benefits associated with the participation of your child in the program including knowing if this program can contribute to improvements in the health outcomes of program participants. This study will help the University of Kansas and community organizations better understand how to involve youth in physical activity programs that are reinforcing outside of school.

PAYMENT TO PARTICIPANTS

You will receive gift cards for your child's participation in some components of this study including for enrollment and participation in the PLAY program, as well as for when your child wears the accelerometer. The total possible amount a parent/guardian may receive for their child's full participation in completing the requested surveys and wearing an accelerometer may be $30.00. However, parents/guardians of youth not requested to wear an accelerometer will only receive the $5 payment upon enrollment of their child in the program and completion of the initial assessment session. KU staff may ask for your social security number in order to comply with federal and state tax and accounting regulations. The maximum possible payment a participant may receive for survey completion is $5.00 for the completion of the initial assessment session, upon enrollment in the program (as indicated by your signature on this consent form).

You also will be paid 30 cents for each day your child wears the accelerometer for at least 10 hours, and for returning the accelerometer at the end of the program. We will ask that you support your child in wearing the accelerometer during the 10-week program, and for 4-weeks prior to the start of the program. All monies for wearing the accelerometer will be paid directly to you (the parent or legal guardian) at the end of the program. The maximum payment possible for wearing an accelerometer is $25 (i.e., $0.30 for 14 weeks for 6 days each week). Only a sample of the youth participating in the program will wear the accelerometer, therefore, all parents/guardians may not receive accelerometer payment.

PARTICIPANT CONFIDENTIALITY

Your child's name will not be associated in any publication or presentation with the information collected about your child or with the research findings from this study. Instead, the researcher(s) will use a study number or a pseudonym rather than your child's name. Your child's identifiable information will not be shared unless (a) it is required by law or university policy, or (b) you give written permission. It is possible, however, with internet communications, that through intent or accident someone other than the intended recipient may see your response.

Permission granted on this date to use and disclose your information remains in effect indefinitely. By signing this form you give permission for the use and disclosure of your child's information, excluding your child's name, for purposes of this study at any time in the future.

REFUSAL TO SIGN CONSENT AND AUTHORIZATION

You are not required to sign this Consent and Authorization form and you may refuse to do so without affecting your right to any services you are receiving or may receive from the University of Kansas or to participate in any programs or events of the University of Kansas. However, if you refuse to sign, your child cannot participate in either component of this study.

CANCELLING THIS CONSENT AND AUTHORIZATION

You may withdraw your consent to allow participation of your child in this study at any time. You also have the right to cancel your permission to use and disclose further information collected about your child, in writing, at any time, by sending your written request to: *Jomella Thompson, University of Kansas, 1000 Sunnyside Ave, Rm 4082, Lawrence, KS 66045.*

If you cancel permission to use your child's information, the researchers will stop collecting additional information about your child. However, the research team may use and disclose information that was gathered before they received your cancellation, as described above.

QUESTIONS ABOUT PARTICIPATION

Questions about procedures should be directed to the researcher(s) listed at the end of this consent form.

PARTICIPANT CERTIFICATION:

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study. I understand that if I have any additional questions about my child's rights as a research participant, I may call (785) 864-7429, write to the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7568, or email irb@ku.edu.

Please note that you will need to check the appropriate boxes below indicating your authorization for participation in the project components. If you are providing consent for your child to participate in both the assessment and PLAY program components, then check both boxes below.

☐ CONSENT FOR PARTICIPATION IN THE SURVEY- I agree to allow my child to take part in the assessment (A-PLAY) component of the study as a research participant. By my signature I affirm that I have received a copy of this Consent and Authorization form.

☐ CONSENT FOR PARTICIATION IN THE PLAY PROGRAM- I also agree to allow my child to take part in the PLAY program components of the study as a research participant. By my signature I affirm that I have received a copy of this Consent and Authorization form.

_____ _____

Type/Print Participant's Name Date

_____

Parent/Guardian Signature

[If signed by a personal representative, a description of such representative's authority to act for the individual must also be provided, e.g. parent/guardian.]

Appendix B

CHILD ASSENT STATEMENT FOR PARTICIPATION IN THE ASSESSMENT

"I am interested in finding ways to help kids become more physically active outside of school. To help us understand what types of physical activities you may like, we will ask you to complete two surveys. If you don't feel like completing the surveys, you don't have to, and you can stop doing this any time and that will be all right. The first survey will help us to better identify the types of physical activity you may prefer. The second survey will help us better understand what youth do during the leisure time outside of school. The majority of the survey will ask questions about how physically active you are, and there are some other questions related to possible types of appropriate activities (such as watching T.V.) or inappropriate activities (such as fighting or using drugs). Don't worry, any information we use from the survey will never identify a certain child by name and we will only share summarized information about all the youth that complete the survey so no one will ever know your response. I will be happy to answer any questions you may have now or whenever you have them. Do you want to take part in this project?"

CHILD ASSENT STATEMENT FOR GENERAL PROGRAM PARTICIPATION

"I am interested in finding ways to help kids become more physically active outside of school, so I would like you to take part in this program, which will be available from 4:00 to 8:00 pm for 10 weeks. You will be doing fun physical activities with other youth. To help us understand what types of physical activities you may like, we will ask you to complete two surveys both at the beginning and end of the program. If you don't feel like participating in the 10-week program or completing the surveys, you don't have to, and you can stop doing this any time and that will be all right. The first survey will help us to better identify the types of physical activity you may prefer. The second survey will help us better understand what youth do during the leisure time outside of school. The majority of the survey will ask questions about how physically active you are, and there are some other questions related to possible types of appropriate activities (such as watching T.V.) or inappropriate activities (such as fighting or using drugs). Don't worry, any information we use from the survey will never identify a certain child by name and we will only share summarized information about all the youth that complete the survey so no one will ever know your response. We will give your parent/guardian $5.00 on your behalf for the completion of the initial assessment session, after you enroll in the program. I will be happy to answer any questions you may have now or whenever you have them. Do you want to take part in this project?"

RESEARCHER CONTACT INFORMATION

Jomella Watson-Thompson, Ph.D.
Assistant Professor, Department of Applied Behavioral Science, University of Kansas
1000 Sunnyside Ave, 4082 Dole Center, Lawrence, KS 66045; p. 785.864.0533; f. 785.864.5281

Appendix C

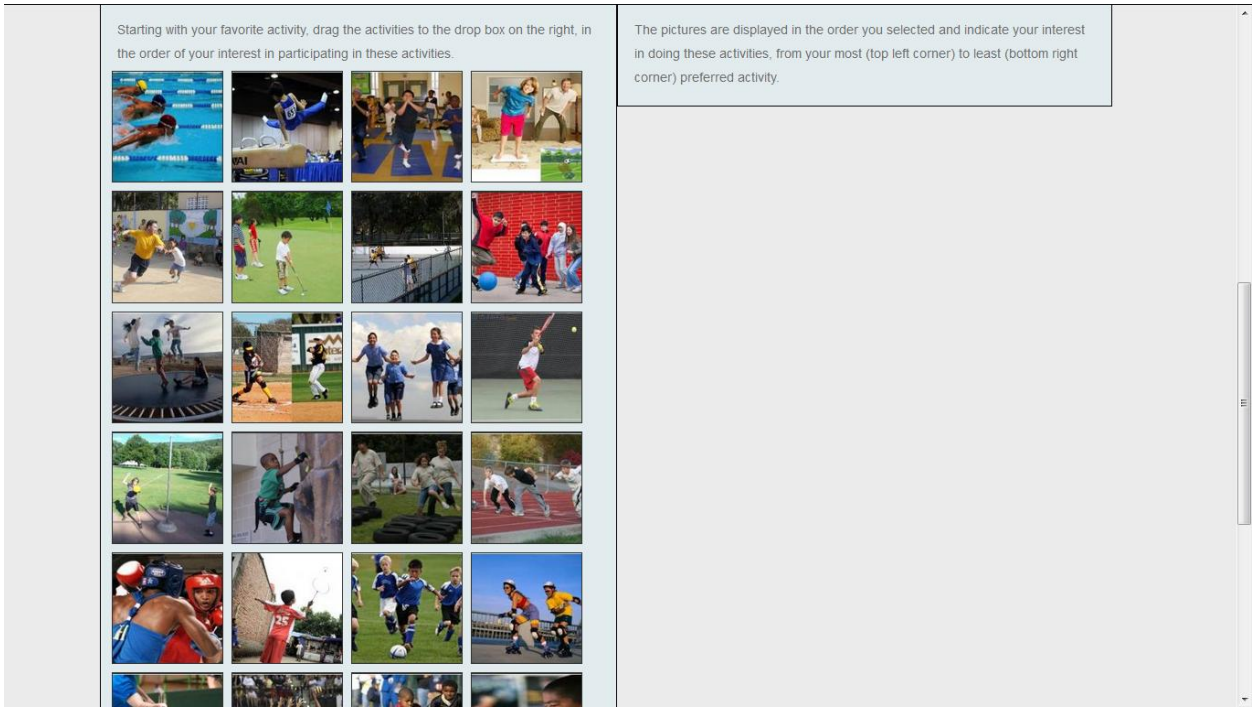
A-PLAY Activity Participation Survey Screenshot

Appendix D

A-PLAY Rank Order Assessment Webpage Snapshot.

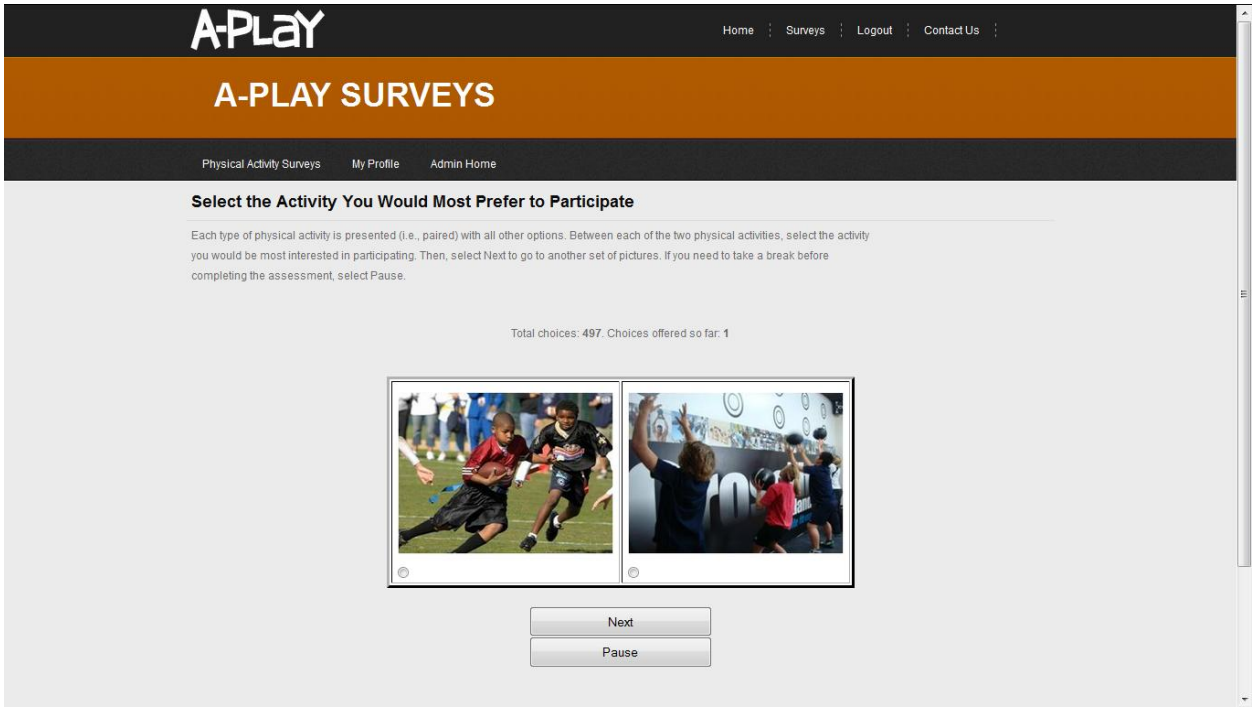
Appendix E

A-PLAY: Multiple Stimulus without Replacement Assessment Webpage Screen Shot.



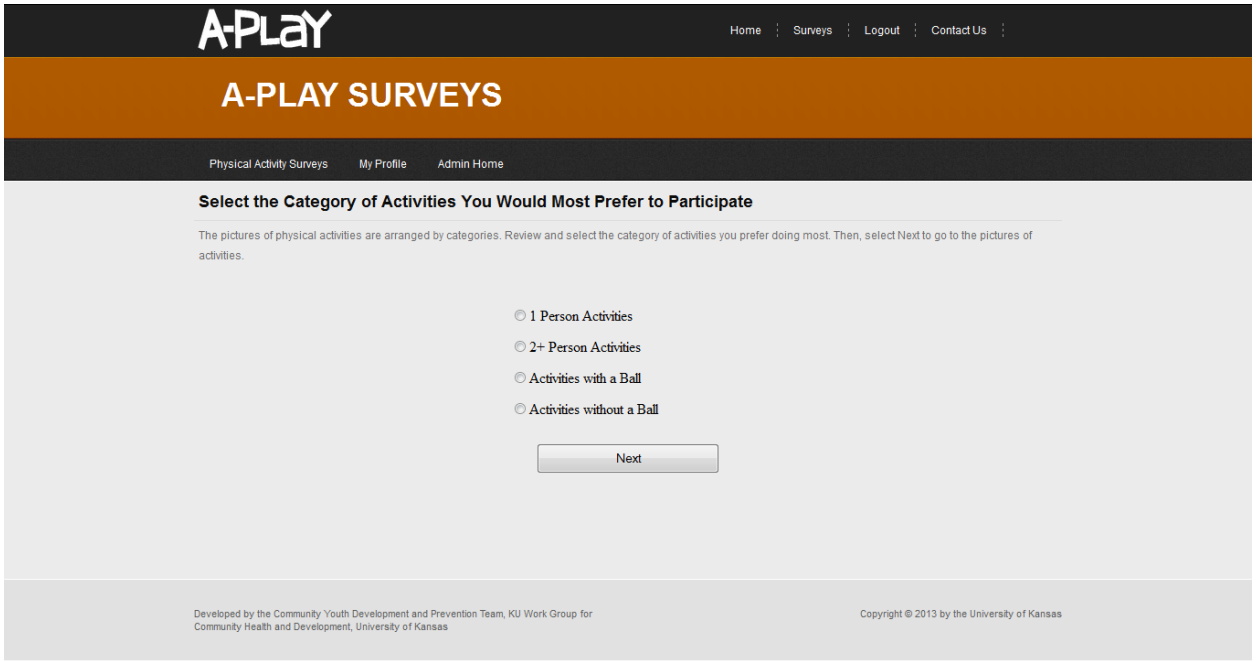
Appendix F

A-PLAY: Paired-Stimulus Assessment Screen Shot



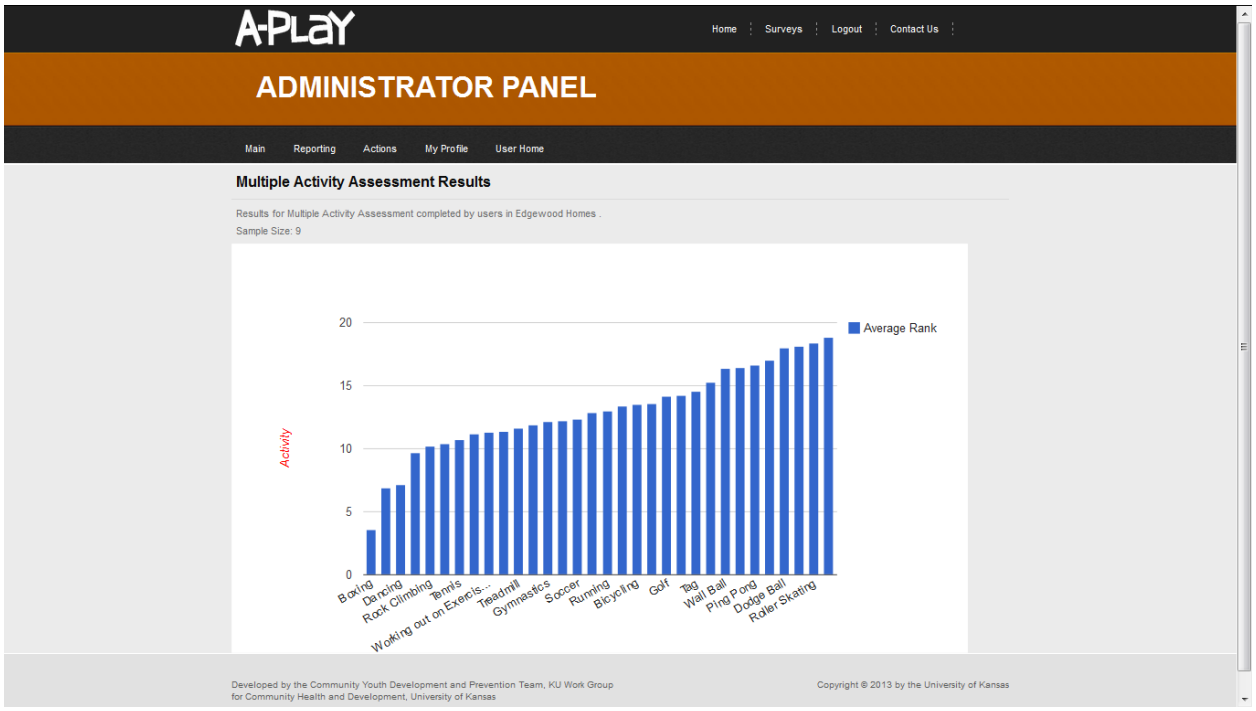
Appendix G

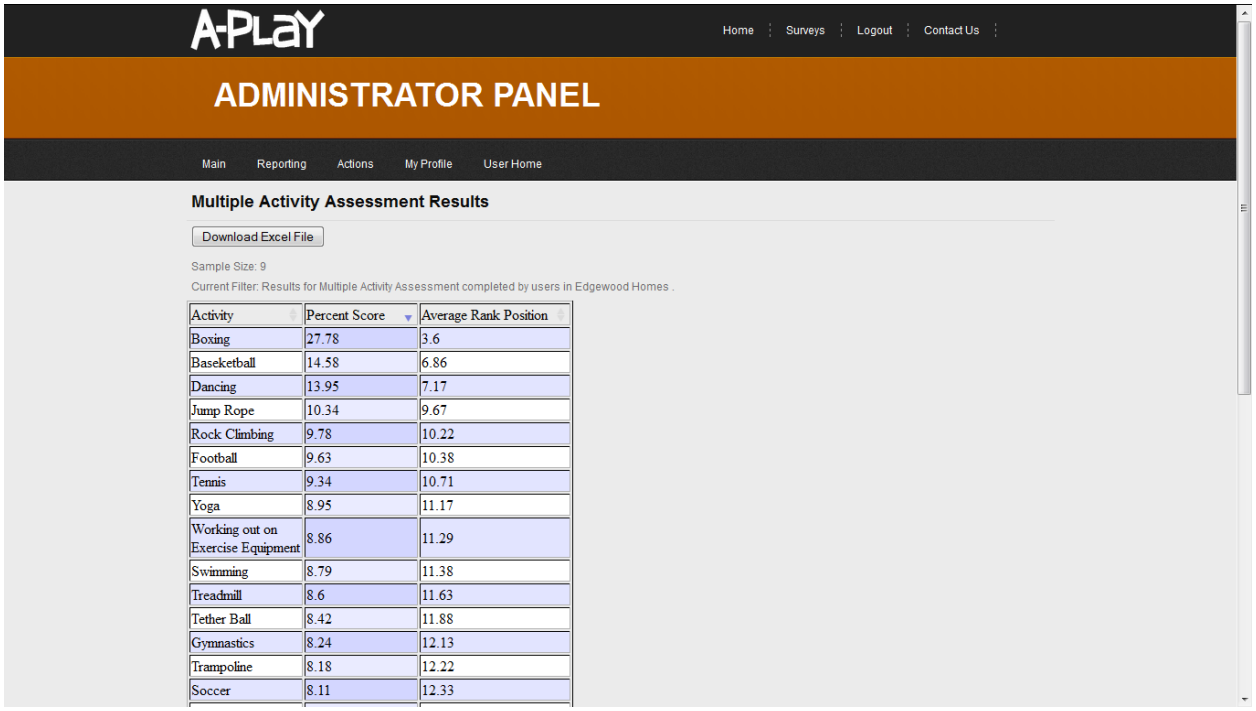
A-PLAY: Categorized Paired-Stimulus Assessment Screen Shot



Appendix H

A-PLAY: Graph and Table Example Screen Shots





Activity	Percent Score	Average Rank Position
Boxing	27.78	3.6
Baseketball	14.58	6.86
Dancing	13.95	7.17
Jump Rope	10.34	9.67
Rock Climbing	9.78	10.22
Football	9.63	10.38
Tennis	9.34	10.71
Yoga	8.95	11.17
Working out on Exercise Equipment	8.86	11.29
Swimming	8.79	11.38
Treadmill	8.6	11.63
Tether Ball	8.42	11.88
Gymnastics	8.24	12.13
Trampoline	8.18	12.22
Soccer	8.11	12.33

Appendix I

A-PLAY: Categorized Paired Choice Stimulus Classes

1 Person Activities	Bicycling	Dancing	Golf	Gymnastics
	Jump Rope	Obstacle Course	Rock Climbing	Roller Skating
	Running	Swimming	Trampoline	Treadmill
	Weight Lifting	Wii Fit	Working out on Exercise Equipment	Yoga
2 + Person Activities	Badminton	Baseball	Basketball	Boxing
	Dodge Ball	Football	Frisbee	Kickball
	Ping Pong	Soccer	Street Hockey	Tag
	Tennis	Volleyball	Wall Ball	
Activities with a Ball	Baseball	Basketball	Dodge Ball	Football
	Golf	Kickball	Ping Pong	Soccer
	Street Hockey	Tennis	Tether Ball	Volleyball
	Wall Ball			
Activities without a Ball	Bicycling	Boxing	Dancing	Frisbee
	Gymnastics	Jump Rope	Obstacle Course	Rock Climbing
	Roller Skating	Running	Swimming	Tag
	Trampoline	Treadmill	Weight Lifting	Wii Fit
	Working out on Exercise Equipment	Yoga		

Appendix J

Test-Retest for MSWO and PS Assessments

	Amy (PS)		Devin (MSWO)		MaShayla (MSWO)		Mikka (MSWO)	
Activities	T1	T2	T1	T2	T1	T2	T1	T2
Badminton	28	31	15	25		21	--	--
Baseball	24	27		23	4	4	22	9
Basketball	29	28	3	4	1	1	13	--
Bicycling	9	11	17	17	17	13	23	5
Boxing	20	23	1	1	11	12	21	19
Dancing	12	8	18	19	9	5	15	21
Dodge Ball	6	15	8	16	14	20	5	--
Football	31	29	5	3	12	10	7	13
Frisbee	18	13	25	--	--	--	--	22
Golf	10	9	--	22	16	24	--	--
Gymnastics	1	3	14	10	2	2	2	3
Jump Rope	2	5	21	21		25	4	23
Kickball	21	20	10	15	19	16	20	15
Obstacle Course	13	18	13	12	--	--	12	24
Ping Pong	16	19		20	--	--	24	--
Rock Climbing	7	6		11	20	23	10	18
Roller Skating	19	16	7	8	15	--	11	14
Running	23	24	9	13	3	11	25	17
Soccer	27	26			13	8	19	
Street Hockey	30	30	19	--	24	--	14	4
Swimming	8	2	6	6	5	7	1	1
Tag	11	10	12	14	21	19	8	10
Tennis	15	17	16	24	7	9	--	8
Tether Ball	14	14	20	--	--	15	--	6
Trampoline	3	4	4	5	8	6	3	2
Treadmill	25	21	11	9	25	17	17	25
Volleyball	22	12	24		6	3	9	
Wall Ball	17	22			23	22	18	12
Weight Lifting	32	32	2	2	10	14		7
Wii Fit	4	1	23	18			6	16
Working out on EE	26	25	22	7	2	18	16	11
Yoga	5	7			18			20
τ	.774***		.506**		.628***		.179	

Note. *Completed PS assessment; EE = Exercise Equipment; Blanks represent MSWO activities ranked below 25.; τ Kendall's rank-order correlation coefficient; * $p < .05$; **<.01;****≤.001

Appendix K

Test-Retest Rankings for the CPS Assessments

	Amy^^		**Calvin°**		**Kyla^**		**Kyla^^**		**Mikka^**		**Rachael^^**	
Activities	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
Badminton	15	15	1	1			2	1			4	5
Baseball	9	13	6	5			12	12			12	14
Basketball	10	11					6	10			8	9
Bicycling					4	5			12	7		
Boxing	11	10					7	11			11	8
Dancing					15	16			9	8		
Dodge Ball	3	8	8	7			13	3			10	7
Football	14	9	3	4			15	15			15	12
Frisbee	7	4					5	8			6	3
Golf			11	11	5	6			16	15		
Gymnastics					11	11			3	3		
Jump Rope					12	3			5	6		
Kickball	8	7	4	3			1	5			3	4
Obstacle Course					8	7			4	4		
Ping Pong	6	5	5	6			4	6			1	1
Rock Climbing					9	10			8	10		
Roller Skating					10	12			13	9		
Running					7	9			6	5		
Soccer	12	12	2	2			8	4			7	11
Street Hockey	13	14	10	12			11	14			13	15
Swimming					3	2			1	1		
Tag	4	2					3	2			9	6
Tennis	1	1	7	8			9	7			5	10
Tether Ball			9	9								
Trampoline					1	1			2	2		
Treadmill					14	15			10	11		
Volleyball	5	3	13	10			10	9			2	2
Wall Ball	2	6	12	13			14	13			14	13
Weight Lifting					2	8			14	12		
Wii Fit					6	4			7	13		
Working out on EE					13	13			11	14		
Yoga					16	14			15	15		
τ	.638***		.821***		.667***		.543**		.717***		.638***	

Note. ^1 Person Activities; ^^2+Person Activities; °Activities with a Ball ; EE = Exercise Equipment; τ Kendall's rank-order correlation coefficient; * $p < .05$; **<.01;****≤.001

Appendix L

Test-Retest (Across Session) Rankings for the RO Assessments

	Alex		Amy		Devin	
Activities	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
(Days between Assessments)	(31)		(21)		(6)	
Badminton	20	12	22	24	31	27
Baseball	8	7	21	21	17	21
Basketball	4	3	24	29	25	3
Bicycling	13	28	19	16	26	13
Boxing	10	11	31	31	1	1
Dancing	25	23	13	4	8	18
Dodge Ball	27	26	11	11	9	15
Football	9	16	25	30	3	4
Frisbee	26	18	30	20	6	23
Golf	12	32	10	14	29	28
Gymnastics	23	6	1	1	14	11
Jump Rope	29	31	6	7	12	22
Kickball	24	15	16	28	11	8
Obstacle Course	32	14	4	9	21	29
Ping Pong	30	22	18	25	15	9
Rock Climbing	7	20	5	6	28	6
Roller Skating	14	24	28	27	5	17
Running	11	27	17	26	27	14
Soccer	3	4	20	23	16	25
Street Hockey	16	10	23	17	18	31
Swimming	2	1	12	10	10	19
Tag	17	29	14	8	20	24
Tennis	31	17	7	15	22	26
Tether Ball	21	21	15	12	23	10
Trampoline	28	13	2	2	4	5
Treadmill	5	9	26	19	19	12
Volleyball	1	2	27	22	24	20
Wall Ball	18	8	8	13	32	32
Weight Lifting	6	5	32	32	2	2
Wii Fit	19	30	3	3	13	16
Working out on EE	15	25	29	18	7	7
Yoga	22	19	9	5	30	30
τ	.310*		.617***		.383**	

Note. EE = Exercise Equipment;
τ Kendall's rank-order correlation coefficient; * $p < .05$; **<.01;****≤.001

Appendix M

Test-Retest Rankings for the PS Assessments Across Time

	Alex		**Amy**		**MaShayla**	
Activities	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
	(321)		(393)		(6)	
Badminton	20	15	28	28	23	30
Baseball	12	5	24	30	7	5
Basketball	2	3	29	27	1	1
Bicycling	5	8	9	19	18	16
Boxing	23	10	20	31	20	18
Dancing	29	26	12	4	2	2
Dodge Ball	21	11	6	13	28	12
Football	14	7	31	29	13	6
Frisbee	28	14	18	8	15	24
Golf	30	24	10	25	12	19
Gymnastics	15	6	1	1	3	7
Jump Rope	27	20	2	7	14	20
Kickball	9	9	21	26	24	9
Obstacle Co**urse**	18	21	13	9	25	29
Ping Pong	24	19	16	24	22	28
Rock Climbing	13	16	7	5	9	15
Roller Skating	19	25	19	23	31	23
Running	8	17	23	20	5	4
Soccer	11	4	27	18	8	11
Street Hockey	25	23	30	15	27	31
Swimming	1	1	8	10	10	10
Tag	16	27	11	14	26	17
Tennis	22	29	15	16	17	13
Tether Ball	17	28	14	6	32	22
Trampoline	7	22	3	3	4	8
Treadmill	6	13	25	22	29	27
Volleyball	3	2	22	21	6	3
Wall Ball	26	30	17	12	30	21
Weight Lifting	4	12	32	32	21	14
Wii Fit	32	31	4	2	16	32
Working out on EE	10	18	26	17	19	26
Yoga	31	32	5	11	11	25
τ	.508*		540.*		.709***	

Note. Days between assessments are displayed in parenthesis (). Amy completed five trials of the PS assessment. Her first and fifth trial are included in this table. EE = Exercise Equipment; τ Kendall's rank-order correlation coefficient; * $p < .05$; **<.01;****≤.001

Appendix N

Amy's Test-Retest Rankings for the PS Assessment Across Five Trials

Activities	Trial 1 (4/19/13)	Trial 2 (4/19/13)	Trial 3 (7/17/13)	Trial 4 (4/26/14)	Trial 5 (5/17/14)	Average Rank
Badminton	28	31	31	32	28	30
Baseball	24	27	29	29	30	27.8
Basketball	29	28	28	27	27	27.8
Bicycling	9	11	17	16	19	14.4
Boxing	20	23	30	30	31	26.8
Dancing	12	8	7	14	4	9
Dodge Ball	6	15	12	6	13	10.4
Football	31	29	27	28	29	28.8
Frisbee	18	13	10	19	8	13.6
Golf	10	9	23	15	25	16.4
Gymnastics	1	3	2	2	1	1.8
Jump Rope	2	5	11	10	7	7
Kickball	21	20	24	24	26	23
Obstacle Course	13	18	8	4	9	10.4
Ping Pong	16	19	25	23	24	21.4
Rock Climbing	7	6	3	7	5	5.6
Roller Skating	19	16	16	21	23	19
Running	23	24	22	18	20	21.4
Soccer	27	26	21	22	18	22.8
Street Hockey	30	30	26	13	15	22.8
Swimming	8	2	1	5	10	5.2
Tag	11	10	9	11	14	11
Tennis	15	17	13	25	16	17.2
Tether Ball	14	14	15	8	6	11.4
Trampoline	3	4	5	1	3	3.2
Treadmill	25	21	18	17	22	20.6
Volleyball	22	12	14	26	21	19
Wall Ball	17	22	19	12	12	16.4
Weight Lifting	32	32	32	31	32	31.8
Wii Fit	4	1	4	3	2	2.8
Working out on Exercise Equipment	26	25	20	20	17	21.6
Yoga	5	7	6	9	11	7.6

Appendix O

Test-Retest Rankings for the MSWO Assessments Across Time

	Amy		Devin		Jada	
Activities	Time 1	Time 4	Time 1	Time 3	Time 1	Time 2
	(21)		(6)		(21)	
Badminton	16		15	18	5	13
Baseball					17	11
Basketball			3	3	9	3
Bicycling	19	20	17	15	15	24
Boxing			1	1	1	1
Dancing	6	3	18	23	11	14
Dodge Ball	18	9	8	14	22	23
Football	22		5	4	10	2
Frisbee	5	19	25	22		
Golf	10	12		20		
Gymnastics	1	1	14		24	12
Jump Rope	4	8	21			
Kickball	21	17	10	24		22
Obstacle Course	14	7	13	11	19	18
Ping Pong	23	16		9	25	21
Rock Climbing	8	5		10	12	20
Roller Skating	17	23	7	16		
Running	24	24	9	13	21	9
Soccer					18	19
Street Hockey	13	18	19	19	23	25
Swimming	7	13	6	6	16	19
Tag	11	10	12	25		
Tennis	12	15	16	17	4	15
Tether Ball	15	11	20	21	14	17
Trampoline	2	2	4	5	6	10
Treadmill		22	11	7	7	8
Volleyball	25	25	24		8	5
Wall Ball	20	14				
Weight Lifting			2	2	13	7
Wii Fit	3	4	23	12	20	
Working out on EE		21	22	8	2	6
Yoga	9	6			3	4
τ	.589***		.636***		.442**	

Note. Days between assessments are displayed in parenthesis (). Amy completed four trials of the MSWO assessment. Her first and fourth trial are included in this table. Devin completed three trials of the MSWO assessment. His first and third trials are included in this table. EE = Exercise Equipment; Blanks represent MSWO activities ranked below 25. τ Kendall's rank-order correlation coefficient; * $p < .05$; **<.01;****≤.001

Appendix P

Devin's Test-Retest Rankings for the MSWO Assessment Across Three Trials

Activities	Trial 1 (5/17/14)	Trial 2 (5/17/14)	Trial 3 (5/23/14)	Average Rank
Badminton	15	25	18	19.33
Baseball*		23		23.00
Basketball	3	4	3	3.33
Bicycling	17	17	15	16.33
Boxing	1	1	1	1.00
Dancing	18	19	23	20.00
Dodge Ball	8	16	14	12.67
Football	5	3	4	4.00
Frisbee	25		22	23.50
Golf*		22	20	21.00
Gymnastics	14	10		12.00
Jump Rope	21	21		21.00
Kickball	10	15	24	16.33
Obstacle Course	13	12	11	12.00
Ping Pong		20	9	14.50
Rock Climbing		11	10	10.50
Roller Skating	7	8	16	10.33
Running	9	13	13	11.67
Soccer				--
Street Hockey	19		19	19.00
Swimming	6	6	6	6.00
Tag	12	14	25	17.00
Tennis	16	24	17	19.00
Tether Ball	20		21	20.50
Trampoline	4	5	5	4.67
Treadmill	11	9		10.00
Volleyball	24		7	15.50
Wall Ball				--
Weight Lifting	2	2	2	2.00
Wii Fit	23	18	12	17.67
Working out on EE	22	7	8	12.33
Yoga				--

Note. *These activities are not displayed in the associated graph. Blanks indicate rankings that are below 25.; EE=Exercise Equipment

Appendix Q

Amy's Test-Retest Rankings for the MSWO Assessment Across Four Trials

Activities	Trial 1 (4/26/14)	Trial 2 --	Trial 3 --	Trial 4 (5/14/14)	Average Rank
Badminton	16	24			20
Baseball*			15		15
Basketball					--
Bicycling	19	7	18	20	16
Boxing					--
Dancing	6	10	9	3	7
Dodge Ball	18	18	17	9	15.5
Football*	22				22
Frisbee	5	15	16	19	13.75
Golf	10	12	20	12	13.5
Gymnastics	1	1	1	1	1
Jump Rope	4	13	7	8	8
Kickball	21	20	25	17	20.75
Obstacle Course	14	6	10	7	9.25
Ping Pong	23	22	22	16	20.75
Rock Climbing	8	14	5	5	8
Roller Skating	17	17	13	23	17.5
Running	24	21	21	24	22.5
Soccer					--
Street Hockey	13	16	12	18	14.75
Swimming	7	5	6	13	7.75
Tag	11	9	8	10	9.5
Tennis	12	11	19	15	14.25
Tether Ball	15	19	14	11	14.75
Trampoline	2	3	2	2	2.25
Treadmill			24	22	23
Volleyball	25	23		25	24.3333
Wall Ball	20	8	11	14	13.25
Weight Lifting					--
Wii Fit	3	2	3	4	3
Working out on EE		25	23	21	23
Yoga	9	4	4	6	5.75

Note. *These activities are not displayed in the associated graph. Blanks indicate rankings that are below 25. EE=Exercise Equipment.

Appendix R

Test-Retest Rankings for the CPS Assessments across Sessions over Time

	Alex °°		**Amy^**		**Annette^^**		**Devin^**		**Devin^^**		**Jada °°**		**MaShayla^^**	
Activities	T1	T2	T 1	T2	T 1	T2	T 1	T2	T 1	T2	T 1	T2	T 1	T2
	(300)		(371)		(300)		(6)		(6)		(300)		(6)	
Badminton					4	4			9	8			10	14
Baseball	8	4			15	15			11	10	7	6	4	2
Basketball	2	2			14	14			3	2	2	3	1	1
Bicycling			8	13			11	13						
Boxing					11	13			1	1			7	5
Dancing			9	6			13	14						
Dodge Ball	5	9			2	3			6	5	8	9	15	10
Football	4	5			13	9			2	3	4	2	5	6
Frisbee					12	8			13	14			6	11
Golf	13	12	11	9			14	15			12	12		
Gymnastics			1	1			12	8						
Jump Rope			5	11			15	12						
Kickball	3	6			10	10			4	6	6	7	11	7
Obstacle Course			12	10			8	5						
Ping Pong	11	8			7	1			5	4	5	8	9	13
Rock Climbing			6	4			10	11						
Roller Skating			10	12			6	10						
Running			14	15			9	9						
Soccer	6	3			9	6			12	12	11	5	2	3
Street Hockey	12	7			3	7			10	7	10	13	12	15
Swimming			2	5			7	7						
Tag					1	2			7	11			13	8
Tennis	9	13			8	5			8	9	3	4	8	9
Tether Ball	7	11									9	10		
Trampoline			3	2			3	3						
Treadmill			13	14			4	2						
Volleyball	1	1			6	11			14	13	1	1	3	4
Wall Ball	10	10			5	12			15	15	13	11	14	12
Weight Lifting			16	16			1	1						
Wii Fit			4	3			5	6						
Working out on EE			15	8			2	4						
Yoga			7	7			16	16						
τ	.487*		.633***		.543**		.750***		.790***		.641***		.700***	

Note. For the categorized paired choice assessment, types of categories are indicated by ^=1 Person Activities, ^^ =2+Person Activities, ° = Activities with a Ball, °°=Activities without a Ball; EE=Exercise Equipment; τ Kendall's rank-order correlation coefficient; * $p < .05$; **<.01;****≤.001